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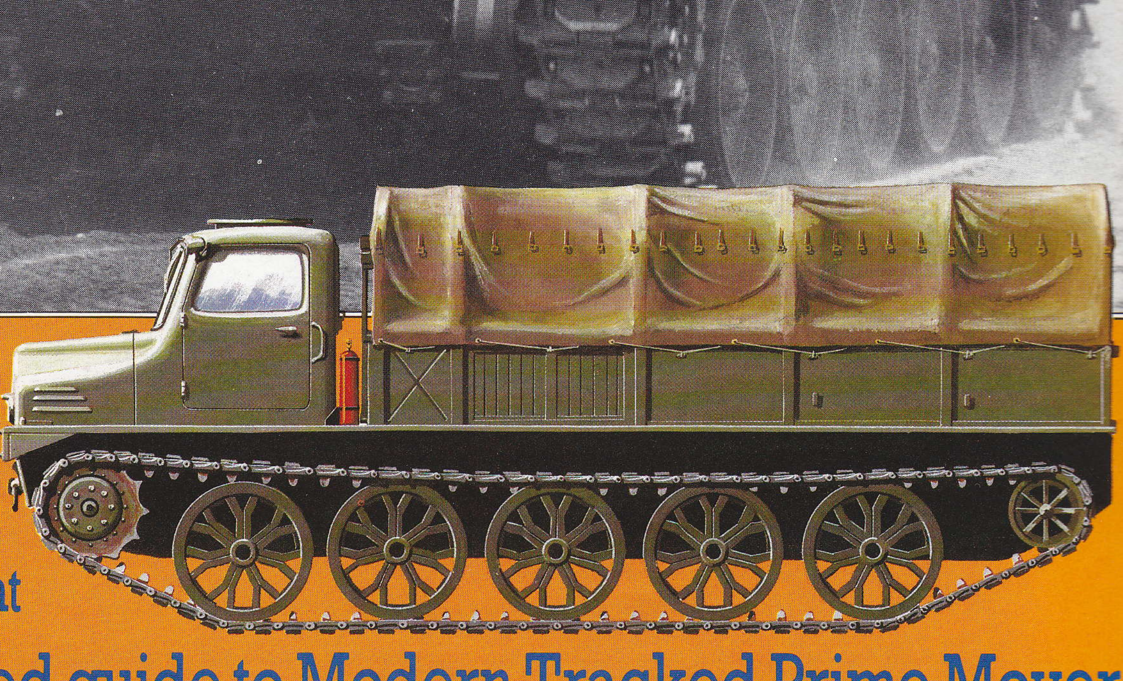

Armed Forces of the World: Chile

The Northern Threat

A fully illustrated guide to Modern Tracked Prime Movers

WAR MACHINE

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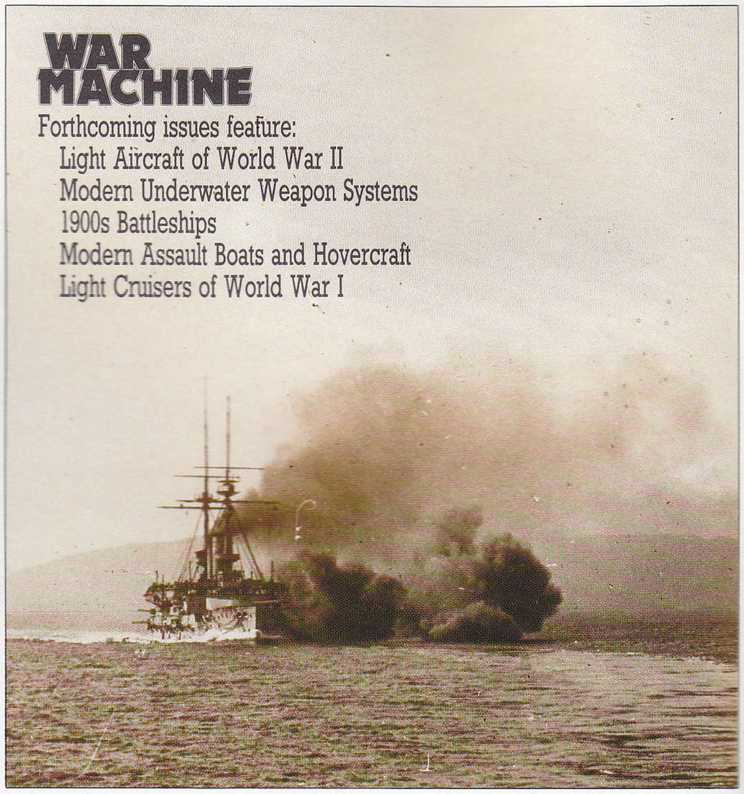

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Modern Tracked Prime Movers

Many armies used powerful tracked vehicles to tow their heavy artillery in World War II, and in the 1950s the USA and USSR built a series of tracked prime movers. Today these have retired from front-line service, but a new generation of tracked support vehicles is appearing.

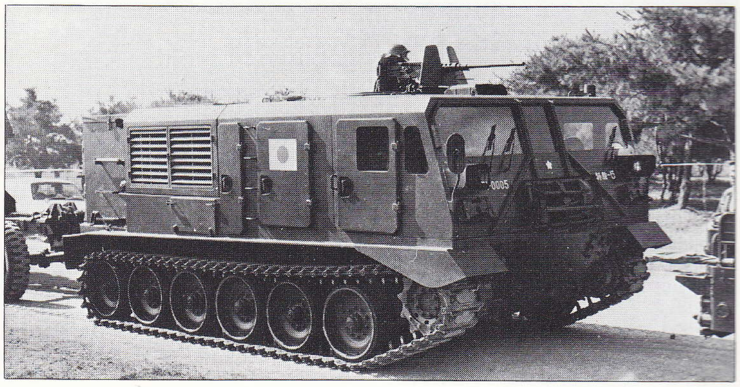
Although self-propelled artillery weapons have been introduced on an ever increasing scale in most European and Middle Eastern armies since the late 1950s, there is still a need for the towed artillery weapon. These are not only cheaper to procure and maintain, but their smaller size and lighter weight makes them much easier to transport by aircraft or helicopter than their tracked counterpart, which can be airlifted only by heavy transport aircraft.

During World War II the USSR, Germany and the USA all developed and placed in production full-tracked prime movers to tow artillery weapons across country as well as carrying the gun crews and a supply of ready-use ammunition.

This trend continued in the post-war period in both the USA and, to a far greater extent, in the USSR. Today the USA prefers to use 6×6 trucks to tow its artillery while the USSR uses a mixture of trucks and full-tracked prime movers. The full-tracked prime mover has now virtually disappeared from front-line service in most Western armies as the USA has not designed and placed in production such a vehicle since the M8A1/M8A2 of the 1950s. In most cases Western armies now tow their artillery with 4×4 or 6×6 cross-country trucks, which are cheaper to maintain and operate than tracked prime movers.

The USSR still use tracked prime movers to tow field guns, anti-tank guns and, to a lesser extent, anti-aircraft guns. In many cases, however, 6×6 cross-country trucks with a central tyre pressure-regulation system have replaced tracked prime movers in the majority of front-line Soviet units.

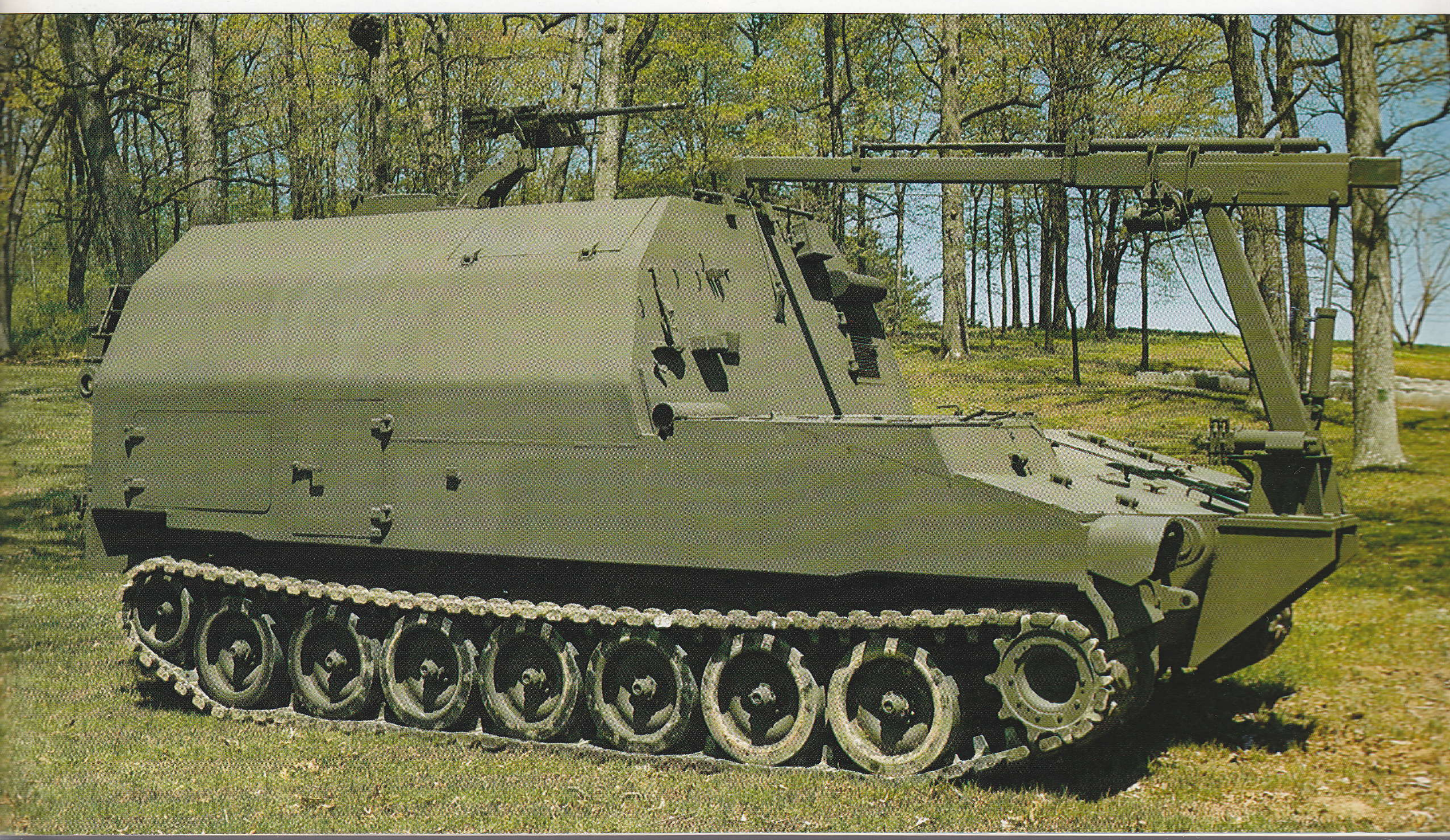
After 1945 the USA and USSR developed a series of vehicles which they have now largely replaced with self-propelled artillery. The Japanese Type 73 is descended from the US M4 and M8 high speed tractors.



The USA has, however, continued development of tracked supporting vehicles such as the M548 and the more recent Fighting Vehicle Systems Carrier. These have the cross-country mobility required to keep up with mechanized formations of tanks, infantry fighting vehicles and artillery.

The increasing effectiveness of artillery on the battlefield has led to the US development of the Field Artillery Ammunition Support Vehicle (FAASV) which will keep M109 self-propelled howitzers supplied with ammunition in the forward battlefield area. It is probable that other armies, in East and West, will in due course develop and deploy systems of this type to enable their self-propelled artillery weapons to remain fully effective.

The US Army has ordered 1,500 M992s, although less than 20 per cent of them have been delivered so far. Saudi Arabia has also ordered a number. The hull of the vehicle is almost identical to that of the M109 with which it will operate, the gun turret being replaced by a fully enclosed compartment.



UK

Alvis Streaker High-Mobility Load Carrier

The **Alvis Streaker** high-mobility load carrier (HMLC) has been developed as a private venture by Alvis Limited of Coventry, and was shown for the first time in 1982. So far two prototypes have been built and tested, but the type has yet to enter production.

The Streaker has been designed to provide logistic support for members of the Alvis Scorpion family of high-speed light tracked vehicles, of which over 3,300 examples have been built for the home and export markets. The Scorpion is well known for its excellent cross-country mobility, but it needs to be supported by a vehicle on the same chassis if its full potential is to be realized.

The Streaker is based on the hull of the Spartan armoured personnel member of the Scorpion family, with the driver seated at the front left under armour protection and the engine compartment to his right. The vehicle is available with the standard Jaguar 4.2-litre petrol engine developing 142 kW (190 hp) or a Perkins 6-cylinder diesel developing 149 kW (200 hp). Either of these is coupled to a TN15 transmission with seven speeds in both directions. The main advantage of the diesel-engined Streaker is a much redued risk of fire and a longer operational range as the diesel is more fuel efficient.

The area to the rear of the driver is the flat load area which can carry up to 3650 kg (8,047 lb) of cargo, with integral seats for three men provided as standard. The cargo area is fitted with removable sides and a tailgate, the sides being usable as loading ramps when attached to the rear of the vehicle. A winch with capacity of 3600 kg (7,937 lb) is fitted as standard to assist in loading heavy items.

Suspension is of the torsion-bar type, and consists of five road wheels, with the drive sprocket at the front and idler at the rear; there are no track-return rollers.

In addition to being used as a cargo vehicle, the Streaker has been designed to tow a wide range of equipment and weapons, for example the Royal Ordnance 105-mm (4.13-in) Light Gun or the Royal Ordnance Bar minelayer. Various weapon systems can be quickly installed in the rear of the vehicle, including the Thorn-EMI Ranger anti-personnel minelaying system, anti-tank guided weapons or even a multiple rocket-launcher such as the Belgian LAU/97 which was demonstrated on the Streaker in 1984.

The design of Streaker is such that it can be quickly adapted to undertake a wide range of roles on the battlefield, in addition to carrying cargo or weapon systems, or towing various weapons.

Alvis has proposed special pallet-mounted systems which can be rapidly changed to meet different operational requirements. For example, one pallet could have a rapid refuelling system which could be quickly exchanged for a pallet with a trench-digger or another with a back-acting digger. If required a dozer blade or loading shovel can also be fitted to the Streaker.

Specification

Streaker

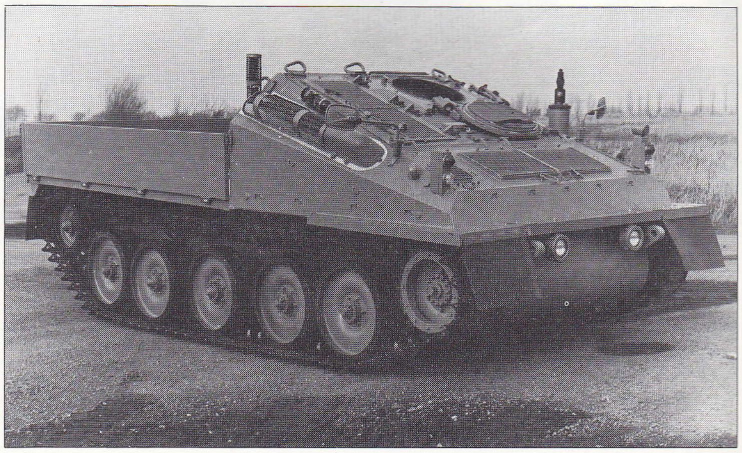
Crew: 1+3

Weights: empty 5354 kg (11,803 lb); loaded 8984 kg (19,806 lb)

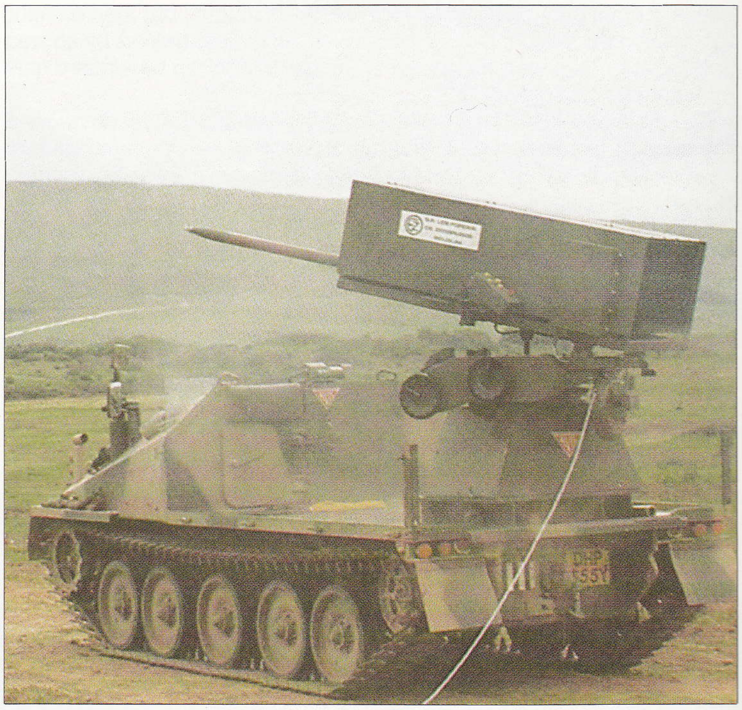
Powerplant: one Jaguar 6-cylinder inline petrol engine developing 142 kW (190 hp)

Dimensions: length 4.877 m (16 ft 0 in); width 2.11 m (6 ft 11 in); height, cab 1.83 m (6 ft 0 in)

Performance: maximum road speed 80.5 km/h (50 mph); range 491 km (305 miles); fording 1.1 m (3 ft 6 in); vertical obstacle 0.61 m (2 ft 0 in); trench 2.1 m (6 ft 9 in); gradient 45 per cent; side slope not known

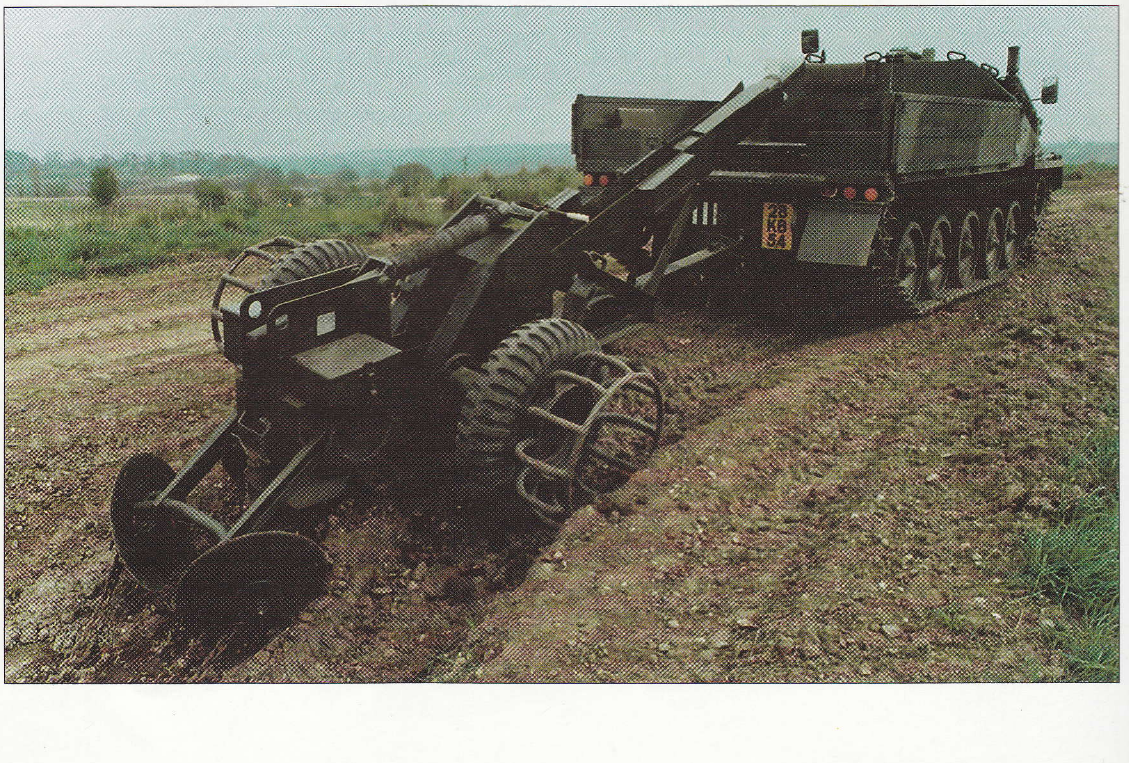


Right: The flat load area of the Streaker can carry up to 3650 kg (8,047 lb) of cargo, with integral seats for three men provided as standard. The cargo area has removable sides and a tailgate and the vehicle is provided with a winch with a capacity of 3600 kg (7,937 lb).



Right: The Alvis Streaker High Mobility Load Carrier (HMLC) is a private venture by the company which has not yet entered production. It is designed to operate with the Scorpion range of vehicles in a number of roles other than cargo carrying. These include various engineering tasks and, here, mounting the Belgian LAU/97 MRLS.

Below: The Scorpion family is renowned for excellent cross-country performance, and the addition of a support vehicle on the same chassis will enable them to realize their full potential. The Streaker is available with either a 4.2-litre Jaguar petrol engine or a Perkins 6-cylinder diesel.



UK

Centaur Multi-Role Military Vehicle

The USA and Germany made large-scale use of halftracked vehicles during World War II, especially in the armoured personnel carrier role. In the post-war period most armies have fielded fleets of tracked or wheeled armoured personnel carriers, although the US M2/M3 series and the Czech OT-810 halftracks are still in service.

In the late 1970s Laird (Anglesey) conceived the idea of building a multi-role halftrack vehicle as a private venture. This would combine the cross-country and load-carrying capability of a tracked vehicle and the ease of operation and performance of a wheeled vehicle.

The first prototypes of the **Centaur** multi-role vehicle were completed in 1978, and pre-production vehicles followed in 1979. The Centaur has been evaluated by a number of countries, but so far large-scale production has not started although development of the vehicle is now complete.

The Centaur is essentially the well known long-wheelbase Land Rover powered by the V-8 petrol engine, with a larger rear cargo area and fitted with suspension parts of the Alvis Scorpion Combat Vehicle Reconnaissance (Tracked), of which some 3,000 have already been built for many overseas countries.

When used as a cargo vehicle the Centaur can carry a maximum load of 3090 kg (6,812 lb) plus the commander and driver; as an alternative 11 fully equipped infantrymen can be seated in the rear of the vehicle. This rear area is provided with the normal drop tailgate, removable bows and a tarpaulin cover.

The Land Rover V-8 engine is coupled to a manual gearbox with four forward and one reverse gear and a two-speed transfer case. The front suspension consists of semi-elliptical springs with double-acting hydraulic shock absorbers. The rear suspension is of the torsion-bar type, and consists of three dual rubber-tyred road wheels, with the drive sprocket at the front and the idler at the rear; there are no track-return rollers. Steering is via the standard Burman recirculating ball type on the front two wheels.

In addition to being used as a basic cargo or troop transport armed with a ring-mounted 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun, the Centaur has been proposed for a wide range of other roles. These include carrying Euromissile Milan ATGW teams, towing the Royal Ordnance 105-mm (4.13-in) Light gun and carrying its gun crew and ammunition, towing the Royal Ordnance Bar minelayer, being fitted with the Thorn-EMI Ranger anti-personnel minelaying system, and acting as a recovery vehicle when fitted with a winch, or as a fuel resupply vehicle, water carrier and command post (with tarpaulin cover or with a fully enclosed rear area and extensive communications equipment).

The Centaur has also been proposed for use in the reconnaissance role fitted with pintle-mounted machine-guns and a 60-mm (2.36-in) breech-loaded mortar, and for towing Rapier and other air-defence systems. For trials purposes it has also been fitted with an Oerlikon-Bührle 20-mm rapid-fire cannon in the rear cargo area.

Specification

Centaur

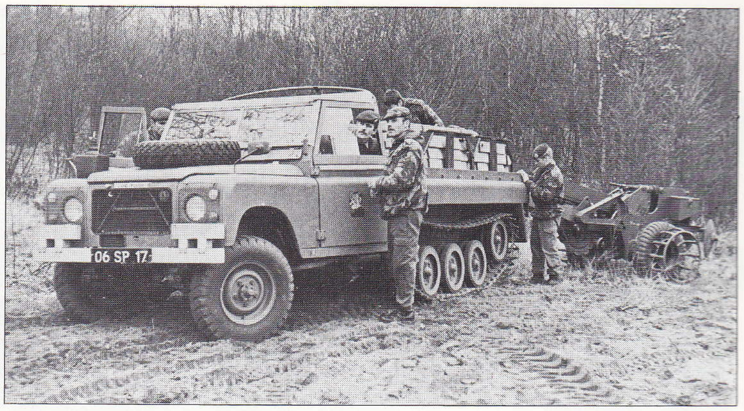
Crew: 1+1

Weights: empty 3880 kg (8,554 lb); loaded 6970 kg (15,366 lb)

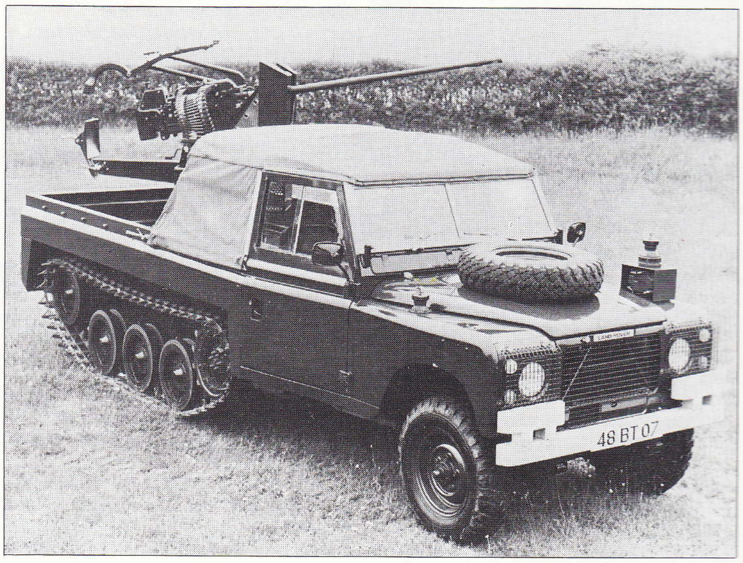
Powerplant: one Rover V-8 petrol engine developing 98 kW (132 hp)

Dimensions: length 5.79 m (19 ft 0 in); width 2.00 m (6 ft 7 in); height 1.70 m (5 ft 7 in)

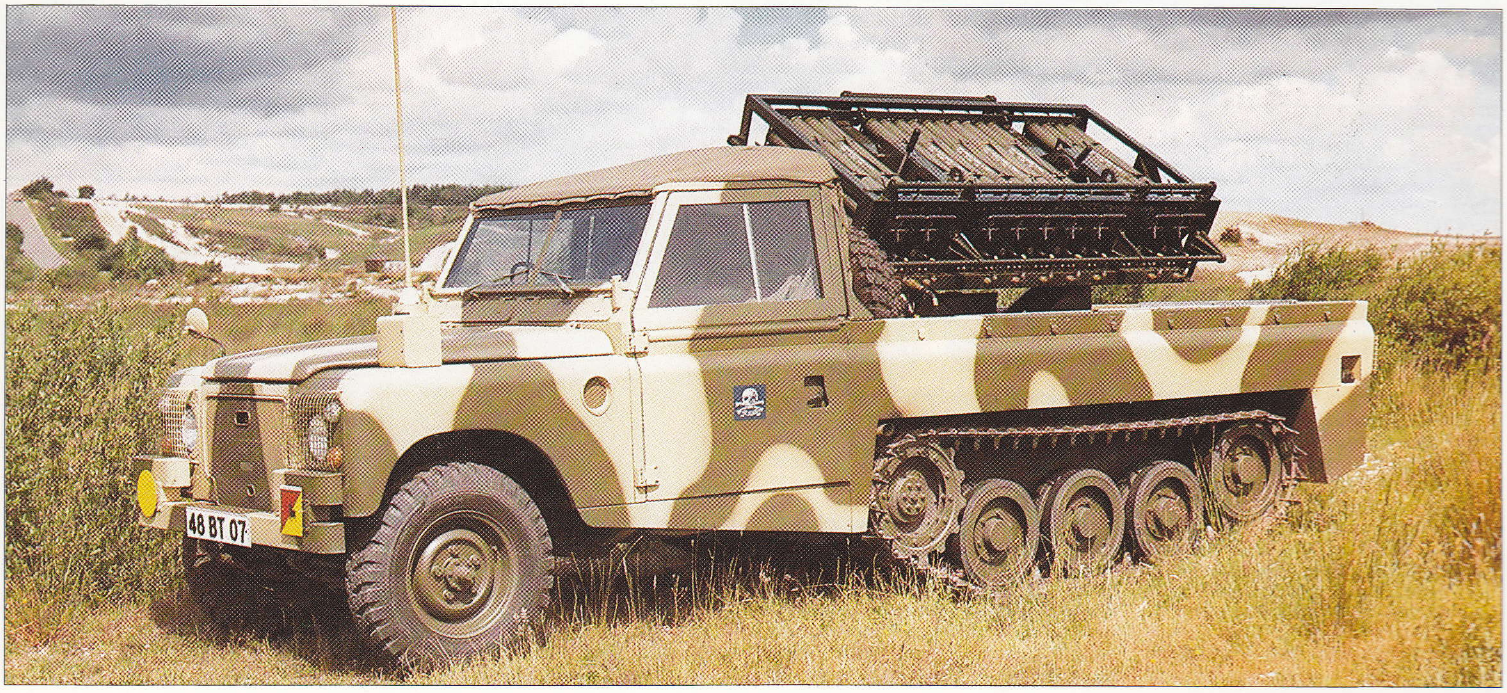
Performance: maximum road speed 100 km/h (62 mph); maximum range (estimate) 402 km (250 miles); fording 0.7 m (2 ft 4 in); vertical obstacle not available; trench not available; gradient 75 per cent; side slope 30 per cent



Seen here towing a Royal Ordnance Bar Minelayer while on evaluation trials, the Centaur marks the return of the halftrack as a support vehicle. The Centaur combines the chassis of the long-wheelbase Land Rover with the suspension of the Alvis Scorpion replacing the rear wheels.



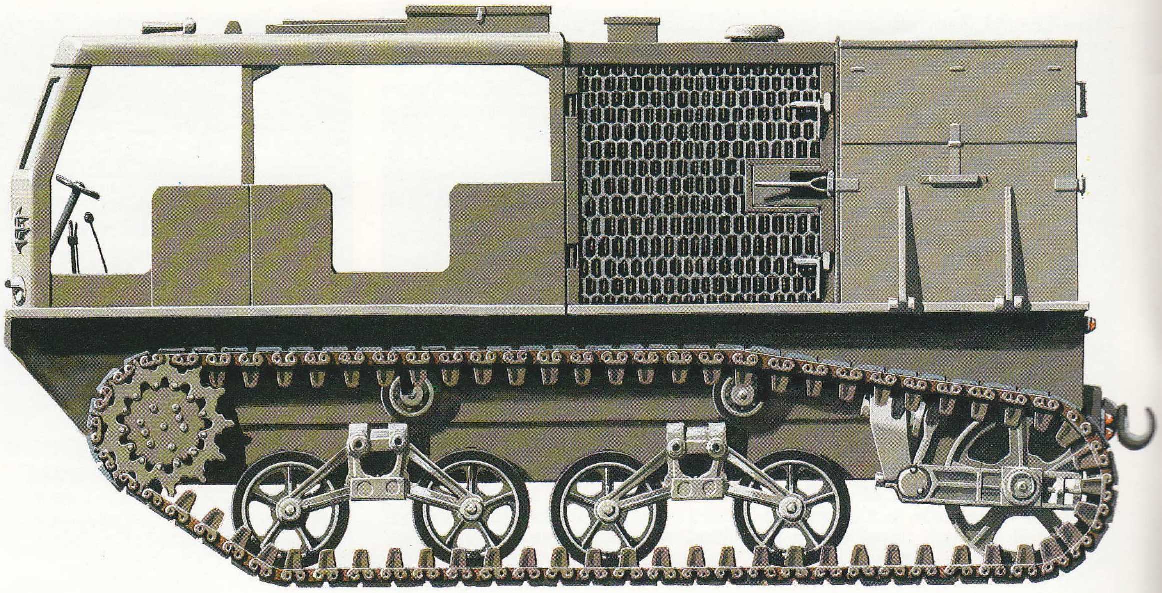
Right: The Centaur has also been fitted for trials purposes with an Oerlikon-Bührle rapid-fire 20-mm (0.78-in) cannon. Other anti-aircraft roles have been projected.



Below: Sporting the famous 'death's-head' badge of the 17th Lancers on the door, this Centaur is fitted with the Thorn-EMI Ranger Mine system which is designed to lay small anti-personnel mines in great numbers. The 72 tubes fire 18 mines each.

USA

M4 High-Speed Tractor


Above: The M4 cab has seats at the front for the driver and one passenger and seating behind for eight gun-crew. Two models were produced originally, one for the 90-mm AA gun designated Class A, and one for the 'Long Tom' 155-mm long-range gun, designated Class B.

In 1941 a decision was taken to design a new medium tractor for the US Army Field Artillery using automotive components of the M2A1 tank. The prototype of this was completed under the designation **T9**, and further development was undertaken under the designation **T9E1**. Trials with the T9E1 were a success, and in 1942 it was standardized as the **M4 Medium Tractor**, renamed the **High-Speed Tractor, 18-ton, M4** in August 1943.

Production of the M4 was undertaken by the Allis-Chalmers Corporation, and in the period after World War II quantities were supplied under the Mutual Defence Assistance Program (MDAP) to a number of countries including Japan, Brazil, Pakistan and Yugoslavia. The M4 has not been used by the US Army for many years.

Two versions of the M4 were built, one to tow the 90-mm (3.54-in) and 76.2-mm (3-in) anti-aircraft guns and the other to tow the 155-mm (6.10-in) 'Long Tom' gun, 203-mm (8-in) howitzer and 240-mm (9.45-in) howitzer. The vehicle was designed to tow artillery weighing between 8165 kg (18,000 lb) and 13608 kg (30,000 lb) on roads and across country, as well as carrying the complete gun crew, personal weapons, artillery ammunition and essential supplies.

When towing the anti-aircraft guns the M4 was called Class A and fitted with an ammunition box with shell racks for 54 rounds of anti-aircraft ammunition. When used in the other role, for towing artillery, it was known as Class B and fitted with a cargo box with shell racks and hold-down plates suitable for ammunition. A total of 30 rounds of 155-mm, 20 rounds of 203-mm or 12 rounds of 240-mm ammunition could be carried (e.g. projectile and charge), plus fuses. Each cargo box was provided with a swing crane and trolley hoist for lifting the heavy projectiles into the box.

The cab is at the front of the vehicle, with seats for the driver and one passenger, and to rear of this are double seats for eight men. Entry is via two doors/openings in each side of the cab. Over the top of the cab is a ring mount for a 12.7-mm (0.5-in) M2HB anti-aircraft machine-gun, for which 500 rounds of ammunition are carried. An M3 tripod mount is also carried so that the M2HB machine-gun can be quickly dismounted for use in the ground role.

The 6-cylinder petrol engine is installed at the rear of the cab and coupled to a manual transmission with three forward and one reverse gear.

The suspension is of the horizontal volute type, and on each side consists of two two-wheeled bogies, a large drive sprocket at the front and a large idler at rear, and two track-return rollers. The tracks are of the steel block/rubber bushed type, and are 422 mm (16.6 in) wide.

Standard equipment includes a tyre inflation hose and a winch with a capacity of 13608 kg (30,000 lb) and 91.4 m (300 ft) of 19-mm (0.75-in) cable.

Specification

M4

Crew: 1+11

Weight: maximum 14288 kg (31,500 lb)

Powerplant: one Waukesha 145GZ 6-cylinder inline petrol engine developing 156 kW (210 hp)

Dimensions: length 5.232 m (17 ft 2 in); width 2.464 m (8 ft 1 in); height including AA machine-gun 2.515 m (8 ft 3 in)

Performance: maximum road speed 53 km/h (33 mph); range 290 km (180 miles); fording 1.04 m (3 ft 5 in); vertical obstacle 0.7 m (2 ft 3 in); trench 1.5 m (5 ft 0 in); gradient 60 per cent; side slope 30 per cent

The M4 High-Speed Tractor stemmed from a 1941 decision to use automotive parts for the M2A1 tank as the basis for a US Army field artillery tractor. It has long been phased out of service with US forces, but the Spanish army has only recently retired its M4s.

USA

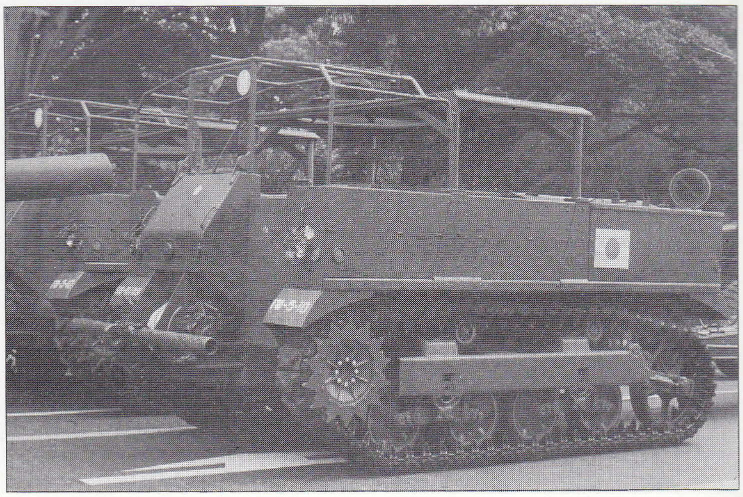
M5 High-Speed Tractor

The development of the **M5** series of high-speed tractors to tow artillery weapons can be traced back to 1941, when the **T20** and **T21** were developed using the suspension and tracks of the M3 light tank already in service with the US Army. In the end development of the T20 was stopped, but the T21 was standardized as the **M5 Medium Tractor** in October 1942, and production was undertaken by the International Harvester Corporation.

In the summer of 1943 the M5 was renamed the **High-Speed Tractor, 13-ton, M5** which, when originally introduced into service, was designed to tow 105-mm (4.13-in) and 155-mm (6.10-in) howitzers as well as carrying their complete gun crews and ammunition. The vehicles were normally armed with a 12.7-mm (0.5-in) M2HB Browning machine-gun for anti-aircraft defence, although the gun crew also had their own small arms such as rifle, sub-machine guns and grenades.

The M5 series has long been phased out of service with the US Army, but in the post-war period it has been supplied to a number of countries including Austria, Japan, Pakistan and Yugoslavia.

There are five models, these being designated the M5, **M5A1**, **M5A2**, **M5A3** and **M5A4**, the major differences being in the track and suspension.


The M5 can tow a weapon weighing up to 9072 kg (20,000 lb) and provision is made for carrying 56 rounds of 105-mm ammunition. The roller visible at the front allows the winch mounted above it to be used in either direction. Five different models have been produced.

M5 High-Speed Tractor (continued)

The M5 can tow weapons weighing up to 9072 kg (20,000 lb) and has a maximum payload of 5000 kg (11,023 lb). Provision is made for carrying 56 rounds of 105-mm ammunition, 38 rounds of 114 mm (4.5-in) ammunition or 24 rounds (e.g. 24 projectile and 24 propellant charges) of 155-mm ammunition.

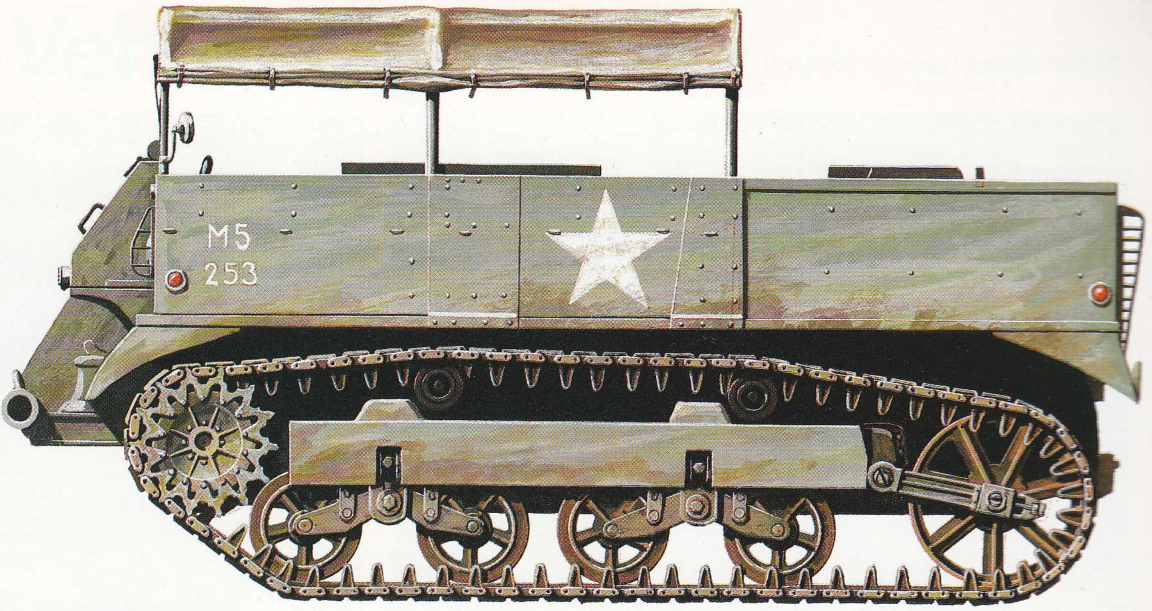
The engine is coupled to a transmission with four forward and one reverse gear, with a two-speed transfer case giving a total of eight gears in each direction.

Mounted at the front of the M5 is a winch with a capacity of 6804 kg (15,000 lb) and two speeds in both directions. A roller located under the winch allows it to be used to the rear of the vehicle as well as at the front.

Standard equipment includes air couplers front and rear, and an electric brake connection for the towed load. The crew compartment can be fitted with a canvas top and side curtains to provide a measure of protection against bad weather.

Suspension of the M5 on each side consists of two bogies, each of which has two small road wheels. The idler is at rear and the large drive sprocket at the front, and there are two small track-return rollers.

The M5A1 is similar to the M5 but has a fully enclosed cab seating a total of 11 men including the driver. The M5A2 has a horizontal volute suspension system and much wider tracks, which give a much lower ground pressure and therefore improved mobility across country. The M5A3 is an M5A1 with suspension system modified to provide for a wide track by the addition of spacers between tractor hull and suspension brackets. The M5A4 has seating for 12 men and a wider hull. The clutch on this model is mechanically operated and the tracks equipped with welded extenders to improve traction in soft ground.



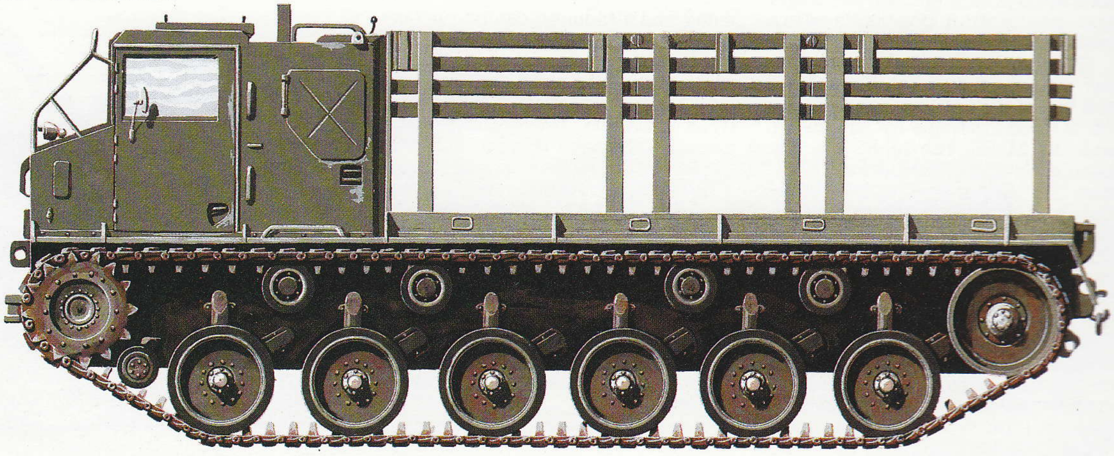
Above: The M5 medium tractor entered production in 1942 with International Harvester and used the suspension of the M3 light tank. Originally designed to tow US Army 105- and 155-mm howitzers, it remains in service with the armies of Austria, Japan and Yugoslavia.

Specification
M5
Crew: 1+10
Weight: loaded 13791 kg (30,405 lb)
Powerplant: one Continental R6572 6-cylinder petrol engine developing 154 kW (207 bhp)
Dimensions: length 5.03 m (16 ft 6 in); width 2.54 m (8 ft 4 in); height 2.69 m (8 ft 10 in)
Performance: maximum road speed 48 km/h (30 mph); range 241 km (150 miles); fording 1.3 m (4 ft 4 in); trench 1.7 m (5 ft 6 in); gradient 50 per cent; side slope 20 per cent

An M5 of the Japanese Ground Self Defence Force on parade sports a 12.7 mm (.50 cal) Browning M2 machine-gun on the ring-mount. The M5A1 has a fully enclosed cab and the M5A2 introduced horizontal volute suspension, and wider tracks giving lower ground pressure.

USA

M8 High-Speed Tractor



The development of the **M8** family of high-speed tractors can be traced back to World War II, when the T33 cargo carrier was developed on the chassis of the M24 Chaffee light tank. This did not prove to be a success, so another vehicle was developed as the **T42**, and this was standardized after the end of the war as the M8 high-speed tractor.

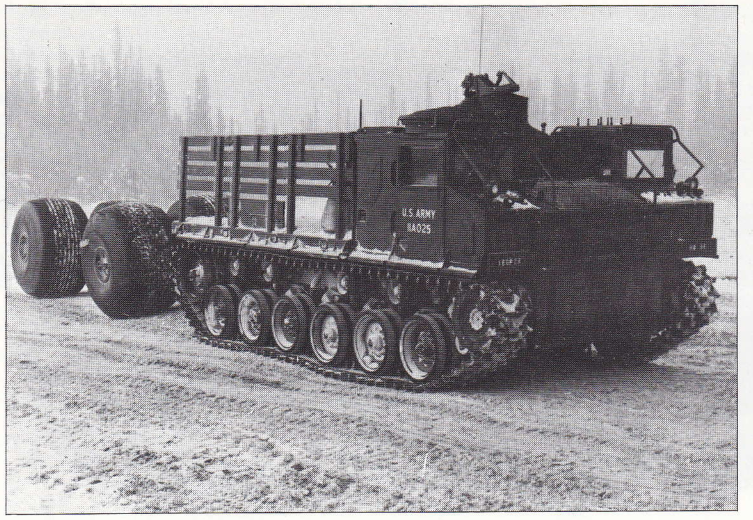
The M8 was powered by a radial petrol engine developing 354 kW (475 hp) coupled to a torquematic transmission. The next model was the **M8E1** using many automotive components of the M41 light tank family, which included the M42 twin 40-mm self-propelled anti-aircraft gun system, and the M44 155-mm (6.10-in) and M52 105-mm (4.13-in) self-propelled howitzers.

The M8E1 was standardized as the **M8A1**, and 480 were built by the Allis-Chalmers Corporation at Milwaukee, Wisconsin. A total of 480 of the **M8A2** with a fuel-injected engine were also built by Allis-Chalmers. Production of the M8A1 and M8A2 ran from 1950 to 1955 and some were subsequently supplied to other countries under the Mutual Aid Program (MAP).

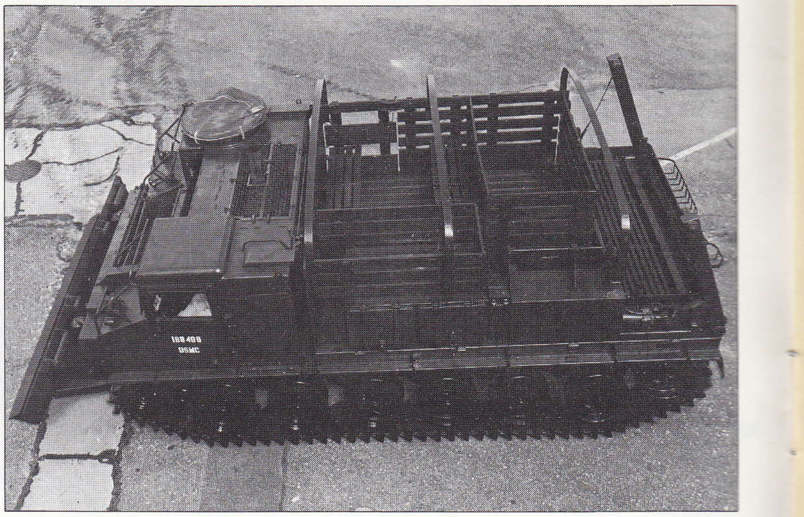
The M8A1 and M8A2 high-speed tractors can tow a weapon or trailer weighing up to 17690 kg (39,000 lb) and carry a payload of 7938 kg (17,500 lb). Typical weapons towed by the vehicle included the 75-mm (2.95-in) M51 Skysweeper anti-aircraft gun, 155-mm M114 howitzer, 155-mm M59 'Long Tom' gun and 203-mm (8-in) M115 howitzer. Kits were available to enable the cargo area to be adapted rapidly for the carriage of the ammunition and charges required by the particular weapon being towed.

The layout of the M8A1 and M8A2 is unusual, with the engine towards the front of the vehicle coupled to a General Motors Corporation (Allison Division) CD-500-3 cross-drive transmission with two forward and one reverse range. The driver is seated in a fully enclosed cab at the front left with the vehicle commander in the opposite cabin to his right. Mounted over the latter is a ring mount for a standard 12.7-mm (0.5-in) anti-aircraft machine-gun, for which 525 rounds of ammunition are provided.

The M8 is testimony to the versatility of the M41 Walker Bulldog light tank, which also provided the basis for 105-mm and 155-mm self-propelled guns and the M42 'Duster' self-propelled AA gun. In US Army service the M8 towed the 75-mm 'Skysweeper' AA gun or 155-mm and 203-mm guns.



An M8 tows rolling liquid transporters during an exercise in Alaska. The M8A1 and M8A2 have an unusual layout with the engine mounted towards the front, connected to a GMC CD-500-3 cross-drive transmission. The driver occupies the left-hand cab and the vehicle commander the right.



When being used as an artillery prime mover, the M8 can be fitted with seats for the gun crew. The cargo area has a drop tailgate and removable bows, and some vehicles have hydraulically operated tailgates to facilitate the offloading of ammunition and supplies.

The torsion-bar suspension on each side consists of six dual rubber-tyred road wheels, the drive sprocket at the front and the idler at the rear, and four track-return rollers.

The large cargo area has high sides, a drop tailgate, removable bows and a tarpaulin cover. When the vehicle is used as an artillery prime mover seats are provided for the gun crew, and many vehicles have a hydraulically operated tailgate to facilitate the offloading of ammunition and supplies. Some vehicles are also fitted with a hydraulically operated dozer blade at the front of the hull, this being used to clear battlefield obstacles as well as to prepare firing positions for the weapon being towed. Standard equipment on all vehicles includes a winch with a capacity of 20412 kg (45,000 lb)

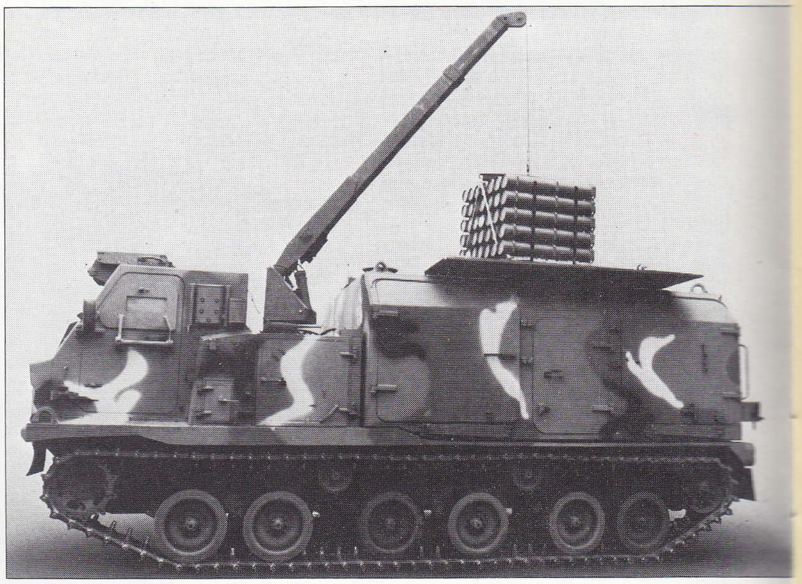
The M8A1 and M8A2 are no longer in service with the US Army as the M51 Skysweeper and M59 'Long Tom' have long been phased out of service, the M115 has been replaced by the self-propelled M110, and the M114 has been supplanted by the M198 which is towed by a standard 5-ton M939 series 6×6 truck.

Specification
M8
Crew: 1+1
Weights: empty 17009 kg (37,498 lb); loaded 24948 kg (55,000 lb)
Powerplant: one Continental AOS-895-3 6-cylinder air-cooled petrol engine developing 644 kW (863 hp)
Dimensions: length 6.731 m (22 ft 1 in); width 3.327 m (10 ft 11 in); height 3.048 m (10 ft 0 in)
Performance: maximum road speed 64.4 km/h (40 mph); range 290 km (180 miles); fording 1.06 m (3 ft 6 in); vertical obstacle 0.46 m (1 ft 6 in); trench 2.13 m (7 ft 0 in); gradient 60 per cent; side slope 30 per cent

USA

M993 Fighting Vehicle Systems Carrier

The M993 Fighting Vehicle Systems Carrier is the support vehicle for the Vought Multiple Launch Rocket System (MLRS) and it shares the same chassis.



The **Fighting Vehicle Systems Carrier** has been designed by the Ordnance Division of the FMC Corporation in San Jose, California, originally to carry the Vought Multiple Launch Rocket System (MLRS). The first prototypes were completed in 1978, and two years later first production contracts were awarded.

The Fighting Vehicle Systems Carrier chassis is designated the **M993** and the US Army is expected to have 342 of these in service by 1987 for use with the MLRS. The MLRS has also been adopted by France (one FVSC from the USA and 56 to be built in Europe), Italy (20 to be built in Europe), West Germany (two from USA and 200 to be built in Europe), and the UK (four from USA and 67 to be built in Europe). The Netherlands is also expected to purchase the MLRS.

The FVSC uses automotive components of the M2 Infantry Fighting Vehicle and M3 Cavalry Fighting Vehicle, of which more than 2,000 have already been built by the FMC Corporation.

The fully enclosed and armoured cab is at the front of the vehicle, and has seats for the three-man crew, communications equipment and an NBC system to allow it to operate in a contaminated area.

The engine comparment is below and to the cab rear, the complete powerpack (consisting of the engine and transmission) being interchangeable with that of the M2 and M3, a fact which has obvious logistical advantages in the field. The complete powerpack can be replaced in 30 minutes, and if required can be run outside the vehicle before being installed.

The suspension of the FVSC is of the torsion-bar type with six dual rubber-tyred wheels, the drive sprocket at the front and the idler at rear, and four track-return rollers. An unusual feature of the suspension is that it has a lockout system operated from within the cab: the suspension is locked out when the rockets are being launched, so providing a more stable firing platform and greater accuracy.

The 12-round Multiple Launch Rocket System is mounted to the rear of the cab, and the rockets are launched by the crew safely ensconced in the cab.

In addition to the M993 Fighting Vehicle System Carrier there is also a basic cargo carrier vehicle (M987) which has yet to be placed in production.

FMC has also built prototypes of the **Armored Forward-Area Rearm Vehicle** (AFARV) which can rearm M60 and M1 series MBTs in the forward battlefield area.

Other variants of the Fighting Vehicle Systems carrier proposed by FMC include the field artillery ammunition support vehicle, maintenance assist vehicle (with a hydraulic crane for changing complete powerpacks in the field), medical evacuation vehicle, mine clearance carrier, command post, carrier for anti-aircraft missiles or long-range attack missiles, and carrier for specialized equipment such as the AN/TPQ-36 and AN/TPQ-37 mortar- and artillery-locating systems.

Specification
FSC
Crew: 1+2
Weights: empty 14514 kg (31,998 lb); loaded 25400 kg (55,997 lb)
Powerplant: one Cummins VTA-903 turbocharged 8-cylinder diesel developing 373 kW (500 hp)
Dimensions: length 6.78 m (22 ft 3 in); width 2.97 m (9 ft 9 in); height, cab roof 2.59 m (8 ft 6 in)
Performance: maximum road speed 61 km/h (38 mph); maximum range 483 km (300 miles); fording 1.02 m (3 ft 4 in); vertical obstacle 0.91 m (3 ft 0 in); trench 2.29 m (7 ft 6 in); gradient 60 per cent; side slope 40 per cent

Fighting Vehicle Systems

Modern combat vehicles require intensive logistic support to enable them to sustain operations for any length of time, but supporting vehicles need to be able to keep up with armoured forces moving cross-country. The Fighting Vehicle Systems Carrier is a support vehicle for the MLRS vehicle, based on the same chassis, but the idea has been extended to produce a vehicle to re-arm Main Battle Tanks on the battlefield.

In November 1972 the Ordnance Division of the FMC Corporation, San Jose, California, was awarded a contract to design and build prototypes of a mechanized infantry combat vehicle (MICV) designated XM723. This had a three-man crew consisting of commander, gunner and driver, and carried eight fully equipped infantrymen.

By 1975 three prototypes and 12 pre-production vehicles had been completed, but in the following year the whole programme was halted while the US Army reassessed its future requirements.

In the end it was decided that one vehicle would be developed to meet the requirements of the infantry as the XM2 Infantry Fighting Vehicle, and another for the cavalry (armoured forces) as the XM3 Cavalry Fighting Vehicle. At the same time it was decided to cancel the XM800 Armoured Reconnaissance Scout Vehicle (ARSV) after prototypes had been built by FMC (a light tracked vehicle) and Lockheed Missile and Space Company (a 6×6 light armoured vehicle).

The XM2 and XM3 were based on the XM723, the main improvements being the replacement of the original one-man turret (armed with a 20-mm cannon) with a new two-man turret (armed with a 25-mm cannon, a 7.62-mm/0.3-in co-axial machine-gun and a twin launcher for Hughes TOW ATGWs).

This whole project was then renamed the Fighting Vehicle System (FVS) which consisted of the XM2 IFV and the XM3 CFV, but from 1977 the programme also included the carrier used with the General Support Rocket System (GSRS), later renamed the Multiple Launch Rocket System (MLRS).

MLRS moves ahead

In September 1977 Boeing Aerospace and the Vought Corporation (now known as LTV Aerospace) were each awarded contracts for the validation phase of the GSRS.

In this phase each company delivered about 150 rockets and three launcher systems to the US Army for extensive trials. Both systems used the same carrier, designed and built by FMC Ordnance Division.

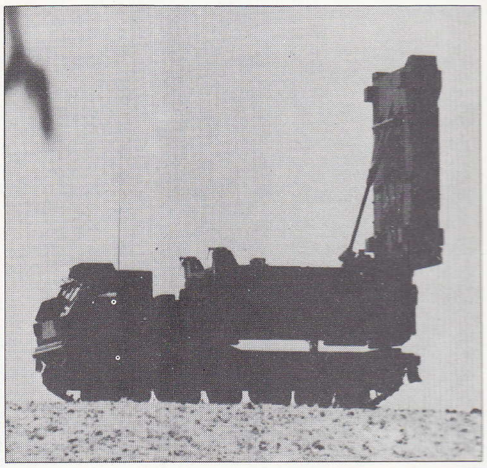
After trials with both the Boeing Aerospace and Vought Corporation systems, the latter was accepted for service in May 1980, by which time France, West Germany, the UK and Italy had all become interested in co-production of the system in Europe.

Into service

The US Army has a requirement for 333 self-propelled launcher loaders (SPLL) based on the Fighting Vehicle Systems Carrier, 362,832 tactical rockets and 27,648 training rockets. In addition 480 8×8 rocket resupply vehicles (based on the Heavy Expanded Mobility Tactical Truck/HEMTT) and trailers are also required.

The first Multiple Launch Rocket System battery was formed for training in the USA in 1982, and by 1983 the system was fully operational. It is now deployed in both the continental USA and in Europe with the US 7th Army.

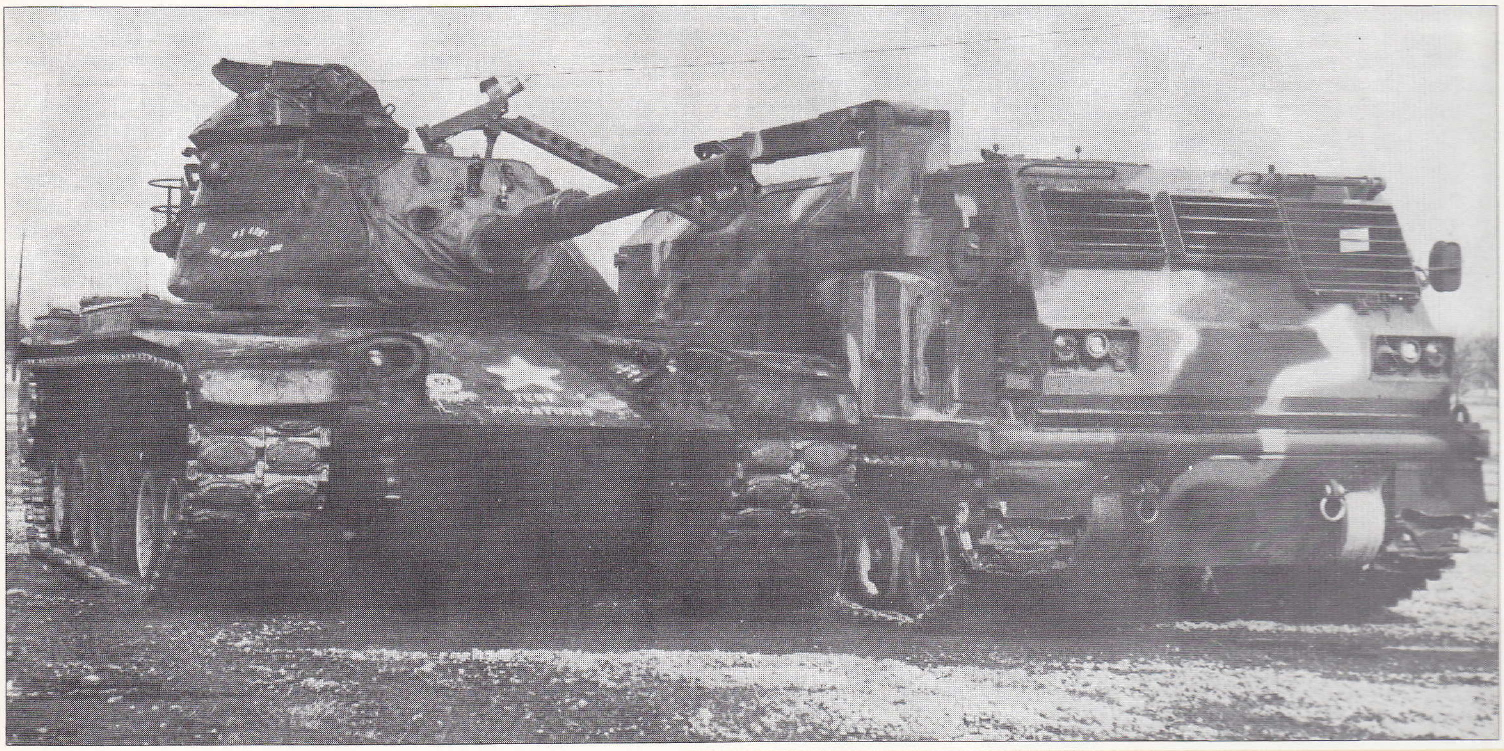
The US Army is now reorganizing its divisional structure, and under the Division 86 plan each armoured and mechanized division will have one battalion consisting of one MLRS battery and two batteries of 203-mm (8in) M110A2 self-propelled howitzers, the latter being capable of firing a wide range of conventional as well as nuclear munitions. Each MLRS battery will have three firing platoons each with three MLRS systems, which will be capable of delivering a massive amount of firepower to a range of over 30000 m (32,810 yards).



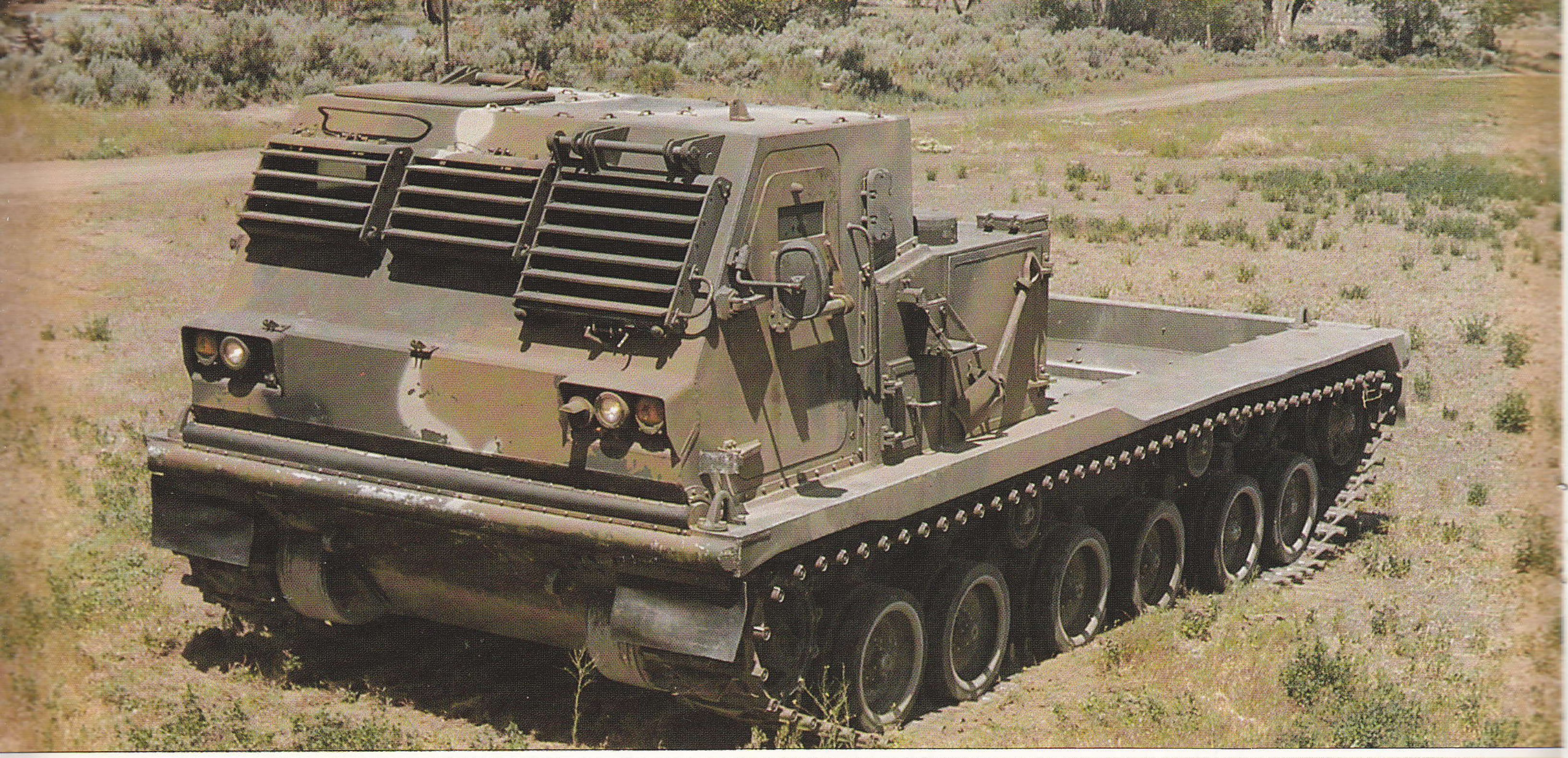
The fully armoured cab of the M993 has seats for its three-man crew and is fitted with an NBC system to enable it to operate in contaminated areas. The engine compartment is underneath and to the rear, and is interchangeable with that of the M2 and M3, offering considerable logistic advantages.

Adopted by NATO

The decision taken in 1978 to make the MLRS a NATO weapon caused a slight delay as the rocket diameter had to be increased, and a decision was taken to develop three warheads. The first is a dual-purpose anti-vehicle/anti-



A prototype of the FMC Armoured Forward Area Rearm Vehicle undergoes tests. This version of the M993 is intended to re-arm M1 Abrams and M60 series MBTs. Mobile enough to keep up with the tanks moving cross-country, this will be a valuable addition to US armoured divisions.



A large number of variants are planned in addition to the basic M993, including field artillery ammunition carrier, medical evacuation vehicle and various engineering models and missile platforms. A maintenance assistance version can mount a powerful winch.

personnel warhead containing large numbers of M77 submunitions, each of which can penetrate 100 mm (3.93 in) of armour, for example the top of a tank where it is most vulnerable. This warhead is at present fitted to all production rockets for the US Army.

The second warhead has been developed specifically to meet the requirements of the West German army, and contains 28 AT-2 anti-tank mines. The third warhead, now in its early stages of development, will contain a number of terminally guided submunitions, each of which will home onto an armoured vehicle.

First NATO MLRSs in 1987

It is expected that a total of 342 self-propelled launcher loaders (SPLL) will be built in Europe, the first systems being completed in 1987. Of these 200 will be for West Germany, 67 for the UK, 20 for Italy and 55 for France. In addition each country has purchased, or will purchase, systems direct from Vought for initial training. Other nations, including the Netherlands, are also expected to adopt the system in the near future, as well as some countries in the Middle East and elsewhere.

Other roles

The basic MLRS carrier is called the M993, and well over 150 of these vehicles have now been delivered to Vought, which integrates the whole system and delivers it to the US Army.

As the MLRS carrier, or Fighting Vehicle Systems Carrier as it is correctly called, uses the same automotive components as the M2 and M3 (for example engine, transmission, steering, suspension and tracks), a wide range of other roles is now being proposed by FMC Corporation.

In recent years the mobility of mechanized forces has been greatly improved by the introduction of new armoured vehicles, for example the M1 Abrams and the M2 Bradley Infantry Fighting Vehicle. These vehicles have to be resupplied with ammunition and fuel, wounded men evacuated, spare parts and other essential supplies moved forward, and damaged and disabled vehicles repaired and recovered. It is essential that the vehicles carrying out these tasks have the same degree of cross-country mobility as those they are supporting, for if they do not forward elements will soon run out of essential supplies and be forced to pull back.

FMC has proposed that the FVSC be modified to undertake a wide range of supporting roles on the battlefield, for example forward armoured ambulance, tank ammunition resupply vehicle, field artillery ammunition support vehicle (the US Army has already selected the M992 system based on the M109 self-propelled howitzer chassis to meet this requirement), maintenance assist vehicle with hydraulic crane, command post/operations centre with extensive communictions equipment provided with armour protection, mine-clearance vehicle, carrier for specialized radar and electronics equipment such as the Hughes AN/TPQ-37 artillery-locating radar, fuel resupply vehicle, recovery vehicle, platform for future tactical missile systems (for example Assault Breaker), and air-defence vehicle with missiles such as Roland.

AFARV tested

FMC Ordnance Division has already completed a prototype of the Armored Forward-Area Rearm Vehicle (AFARV) which, if standardized, will be issued on the scale of seven per M60/M1 tank battalion and eight per M2 Bradley mechanized infantry battalion.

The AFARV has an identical chassis and cab to the MLRS carrier, but to the rear of the bullet- and NBC-proof cab are armoured stowage compartments for 105-mm (4.13-in) and 120-mm (4.72-in) tank ammunition. Basically, a tank requiring fresh ammunition draws up alongside the AFARV and the loader's hatch is opened up. The AFARV then transfers new ammunition to the MBT with the aid of a conveyor system while the crew of both vehicles remain under armour protection. In addition (or indeed as an alternative to tank ammunition) the vehicle can carry not only small arms ammunition but also replacement TOW missiles for the M2 Bradley IFV, M901 Improved TOW Vehicle and standard infantry systems, plus 25-mm ammunition for the Chain Gun of the Bradley.

FAALS concept

More recently FMC Ordnance Division has been pushing the Forward Area Armored Logistics Systems (FAALS) to the US Army. This has evolved out of an in-depth study of the 1973 Middle East conflict and possible future conflicts.

The FAALS is based on the Fighting Vehicle Systems Carrier and consists of three vehicles: FAALS-Refuel, FAALS-Rearm and an armoured maintenance vehicle.

The armoured maintenance vehicle will be fitted with a 4536-kg (10,000-lb) capacity crane able to change complete tank powerpacks in the field, and will be provided to the cab rear with a module capable of supporting operations such as repair, replacement and diagnostics. It will also be able to tow a four-wheeled trailer carrying a complete tank powerpack (engine and transmission).

Current US Army ammunition trucks and resupply vehicles not only lack cross-country mobility compared with the vehicles they support, but also have no armour or NBC protection. The FAALS-Rearm vehicle will be able to resupply two M1 tanks simultaneously and carry 120 rounds of tank ammunition. This particular vehicle has evolved from the AFARV already tested by the US Army.

The FAALS-Rearm can, be converted to FAALS-Refuel configuration in one hour with 7571 litres (2,000 US gal) of fuel transferrable to tanks at the rate of 303 litres (80 US gal) per minute.

Future of FAALS

There is no doubt that the US Army requires the Forward Area Armored Logistics System, but its procurement is a question of whether or not sufficient funding can be found within an already tight US Army budget. In the past there has been funding for front-line items such as M1 tanks, M2 Infantry Fighting Vehicles and anti-tank systems, but insufficient funding has been provided for the essential support vehicles without which the front-line vehicles cannot operate over an extended period.

USA

M548 Tracked Cargo Carrier

The development of the **M548 Tracked Cargo Carrier** can be traced back to the early 1960s, when the US Army Signal Corps issued a requirement for a full-tracked vehicle to carry specialized electronic equipment.

The first prototype was completed under the designation **XM548**, but this was not placed in production and further development resulted in the **XM548E1** which used automotive components of the M113A1 tracked armoured personnel carrier already in production by the FMC Corporation. The XM548E1 was subsequently standardized as the M548 in 1965, and the first production vehicles were completed by FMC Corporation in 1966.

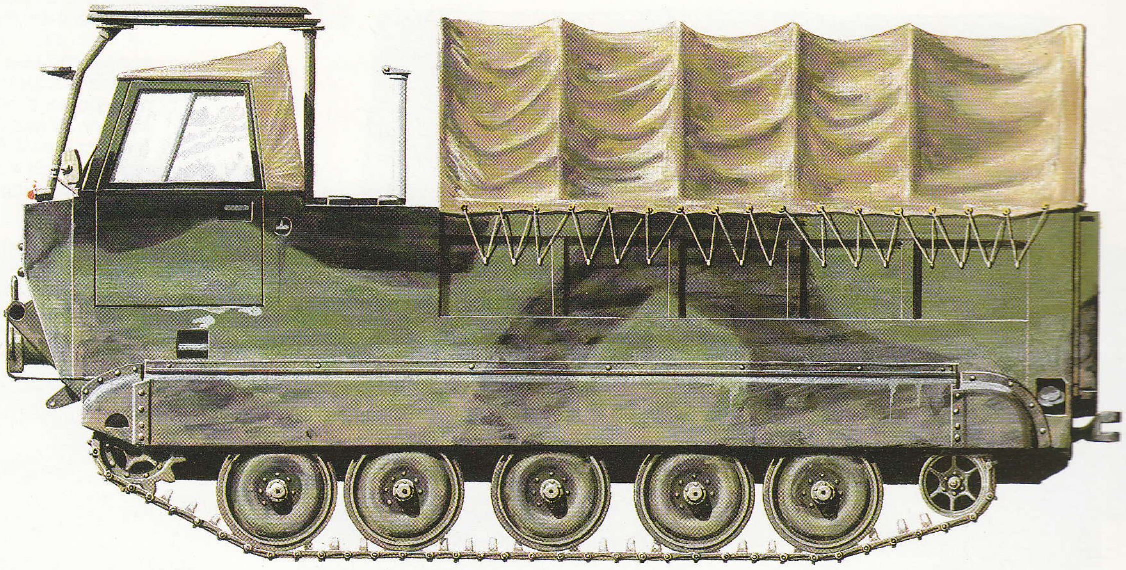
By October 1984 the company had built no less than 3,683 M548s for the US Army and 1,295 vehicles for the export market. The current production model is the **M548A1**, which has a number of important automotive improvements.

In addition to service with the US Army, the M548 is used by many other armies including those of Australia, Canada, Egypt, Greece, Israel, Italy, Norway, Spain, Switzerland, Tunisia, the United Kingdom and West Germany.

The basic vehicle is designed to carry 5443 kg (12,000 lb) of cargo on roads and across country, as well as towing a trailer or weapon weighing up to 6350 kg (14,000 lb). Besides acting as a cargo carrier in forward areas, the M548 is also widely used as an ammunition support vehicle for self-propelled artillery pieces such as the M107, M109 and M110.

Although the M548 uses automotive components of the M113 series, it has a different hull and layout. The driver and three passengers are seated at the very front of the hull with the engine and transmission under their seats. The engine is coupled to a fully automatic transmission with six forward and two reverse speeds. The cab has a removable canvas top and rear, and the windscreen can be folded forwards if required. Over the top of the cab is a ring mount for a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun.

The suspension is of the torsion-bar type and consists of five road wheels, with the drive sprocket at the front and idler at the rear; there are no track-return rollers.



One of the most widely-used tracked support vehicles in service today, the M548 stemmed from a US Army Signal Corps requirement for a tracked vehicle to carry electronic equipment. Although the M548 shares a number of automotive parts with the M113 APC, its hull and layout are totally different.

The cargo area is at the rear, and has two doors at the very rear for loading purposes, removable bows and a tarpaulin cover.

The M548 is fully amphibious, being propelled in the water by its tracks, and standard equipment includes infra-red night-driving lights and winch. The vehicle does not have an NBC system.

The M548 chassis has been used as the basis for countless specialized vehicles including the British Aerospace Tracked Rapier surface-to-air missile system and its dedicated supporting vehicles; the transporter and launcher for the Vought Lance surface-to-surface missile system, which can have a tactical nuclear warhead; a specialized electronics vehicle for radars and electronic warfare; a minelayer; the launch vehicle for the M730 Chaparral surface-to-air missile system with four missiles in ready-to-launch position; a twin 35-mm self-propelled anti-aircraft gun; a recovery vehicle; and a mine-clearance vehicle.

Specification

M548

Crew: 1+3

Weights: empty 7439 kg (16,400 lb); loaded 12882 kg (28,400 lb)

Powerplant: one Detroit Diesel Model 6V-53 6-cylinder liquid-cooled diesel developing 160 kW (215 hp)

Dimensions: length 5.893 m (19 ft 4 in); width 2.692 m (8 ft 10 in); height overall 2.82 m (9 ft 3 in)

Performance: maximum road speed 64 km/h (40 mph); range 483 km (300 miles); fording amphibious; vertical obstacle 0.61 m (2 ft 0 in); trench 1.68 m (5 ft 6 in); gradient 60 per cent; side slope 30 per cent

Below: The basic model M548 is designed to carry 5443 kg (12,000 lb) of cargo as well as to tow a trailer or weapon weighing up to 6350 kg (14,000 lb). The driver and three passengers are seated at the front above the engine and transmission.

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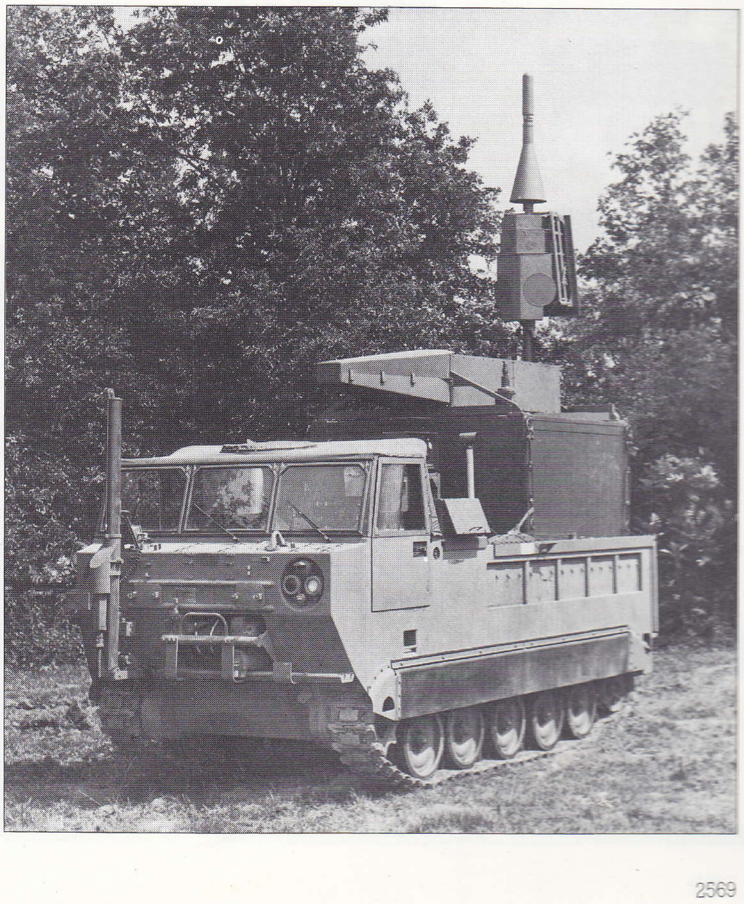
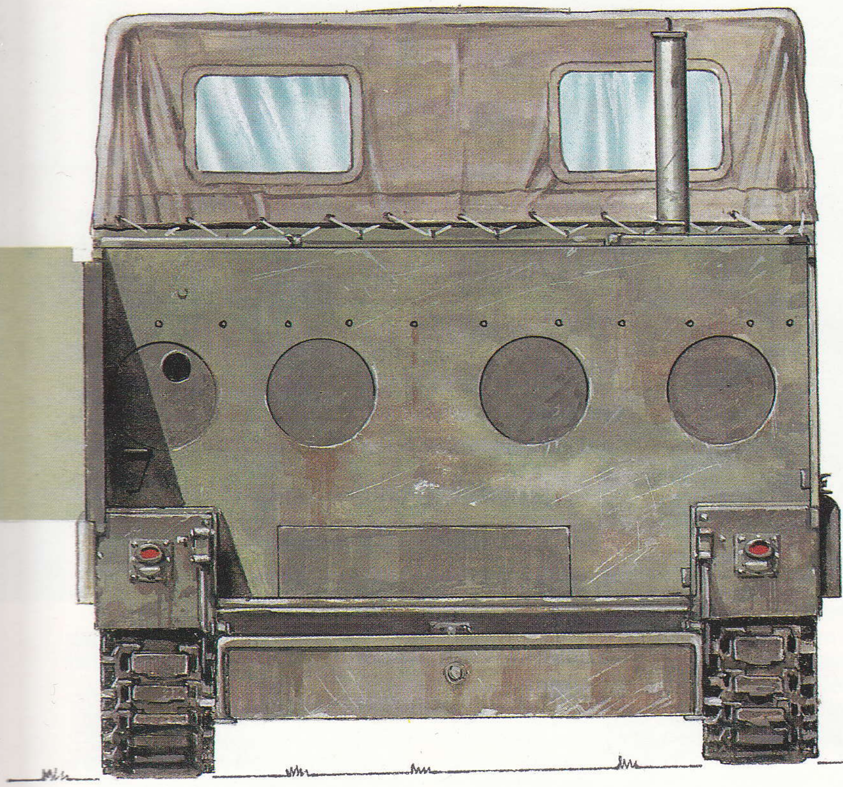
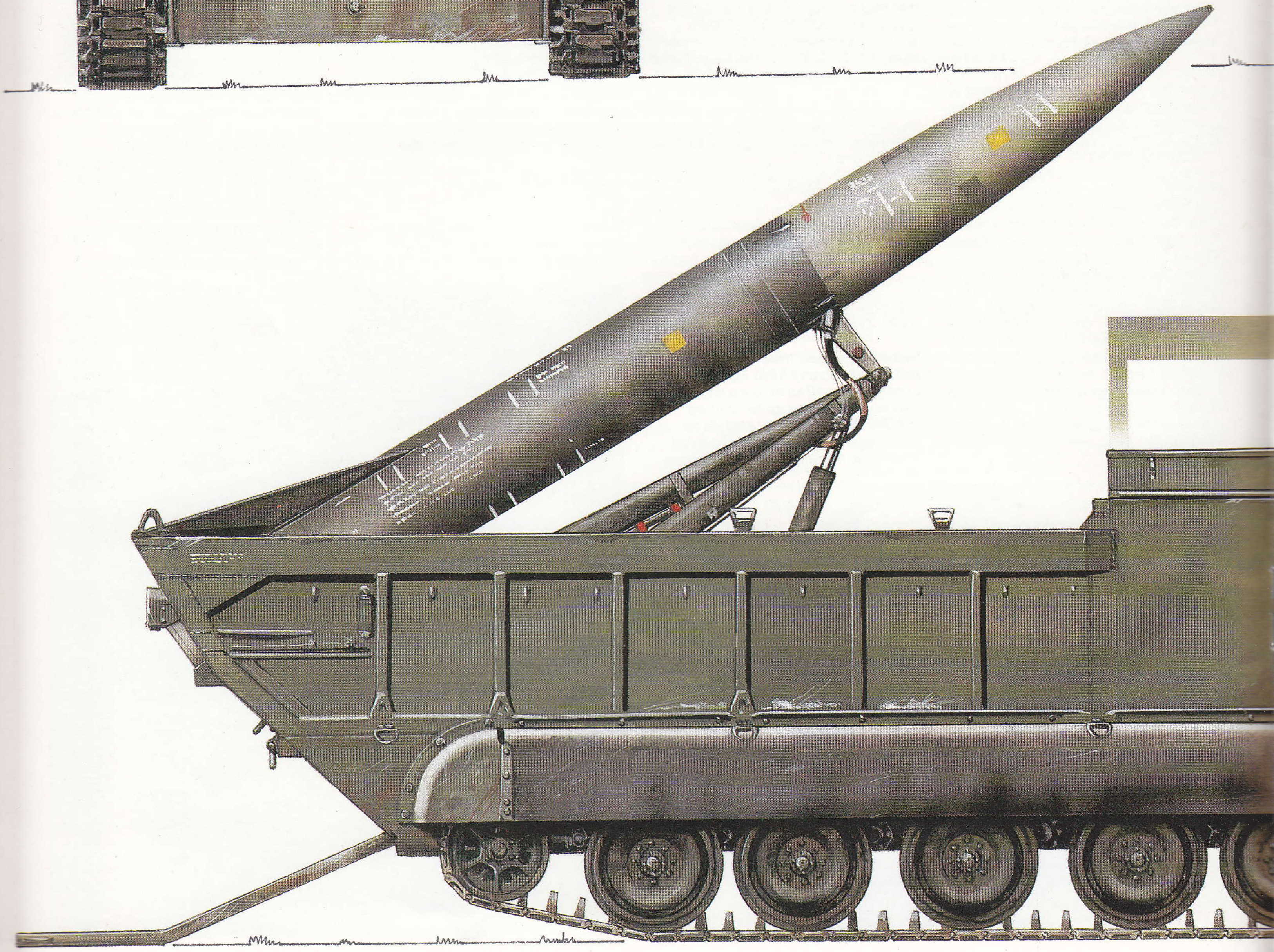


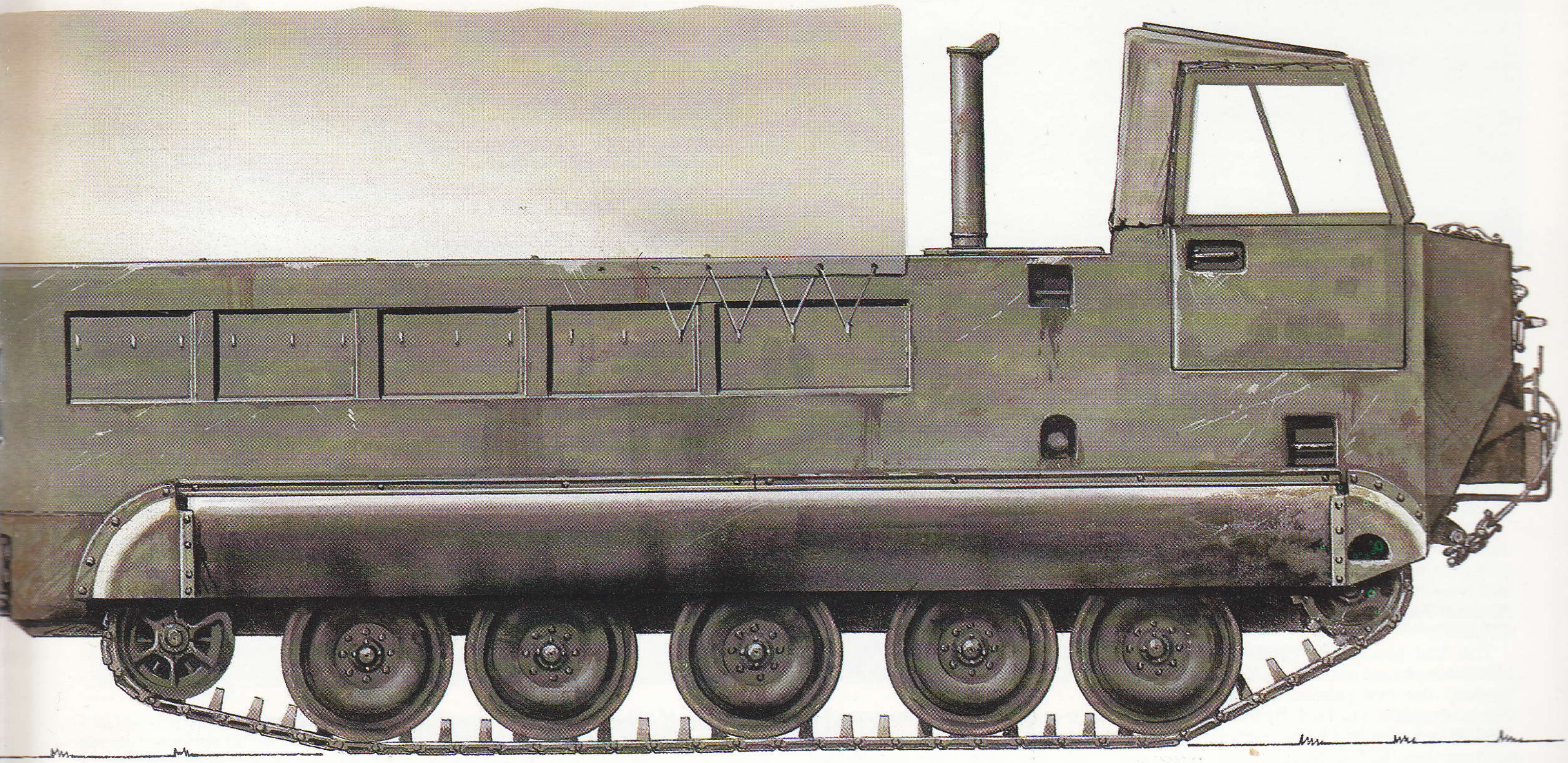
The M548 chassis is used for numerous specialist roles including mobile electronic warfare, as seen here. It is also used to carry the British Aerospace Tracked Rapier SAM system and its dedicated support vehicles, and the Chaparral and Lance missiles.

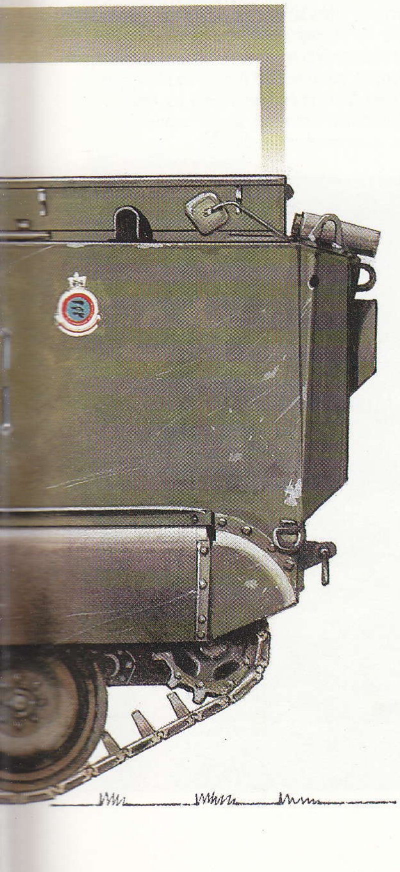
M548 Cargo Carrier & M752 Lance Missile Launcher

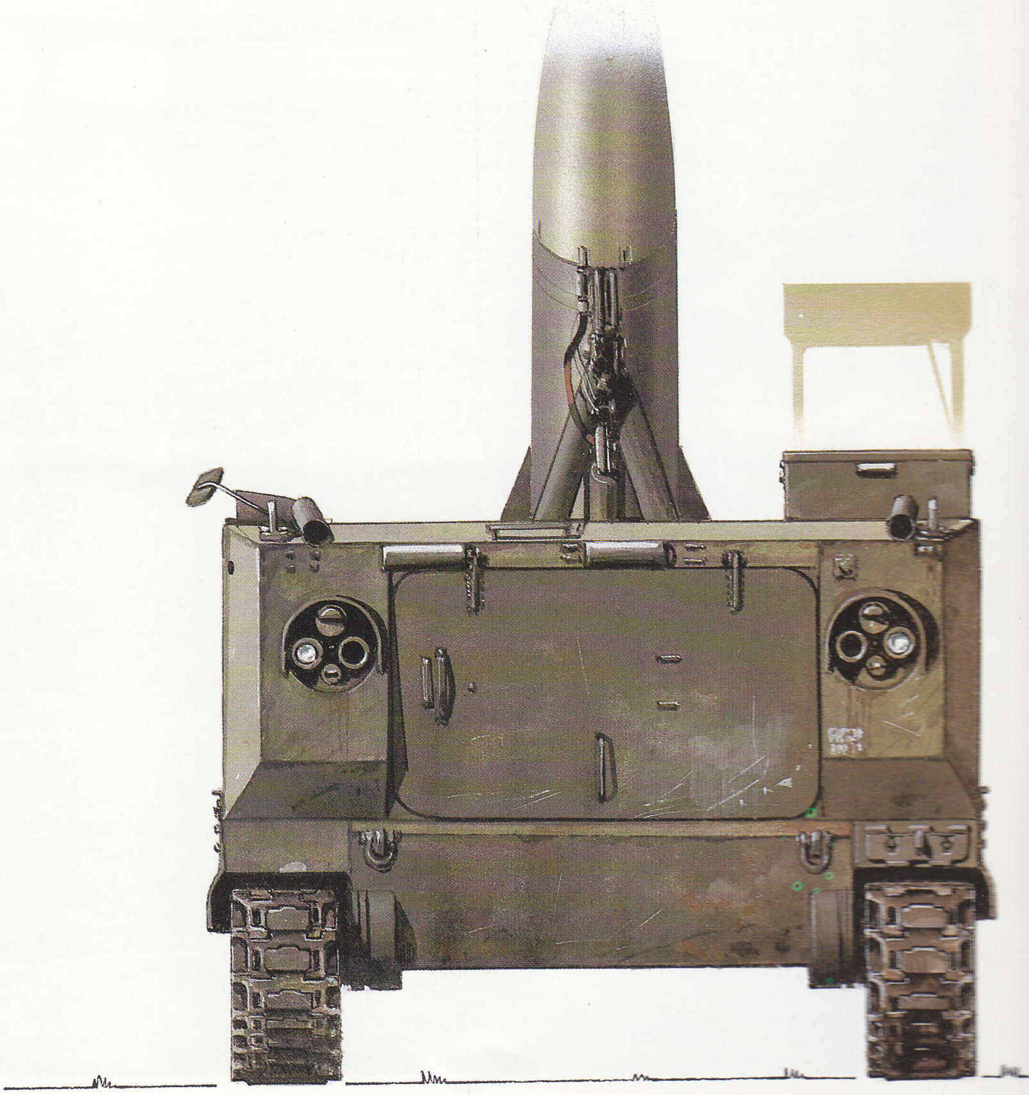
The M548 chassis serves in a wide variety of roles. Seen here are the basic cargo carrier model and the launcher vehicle for the Lance surface-to-surface nuclear-capable missile. The M548 also provides support vehicles for the Lance system, a transporter model carrying the re-loads for the battery. By late 1984 some 3,683 M548s had been built for the US Army and 1,295 for the export market. Over a dozen nations use variants of the M548, including the UK, West Germany, Italy and Spain.





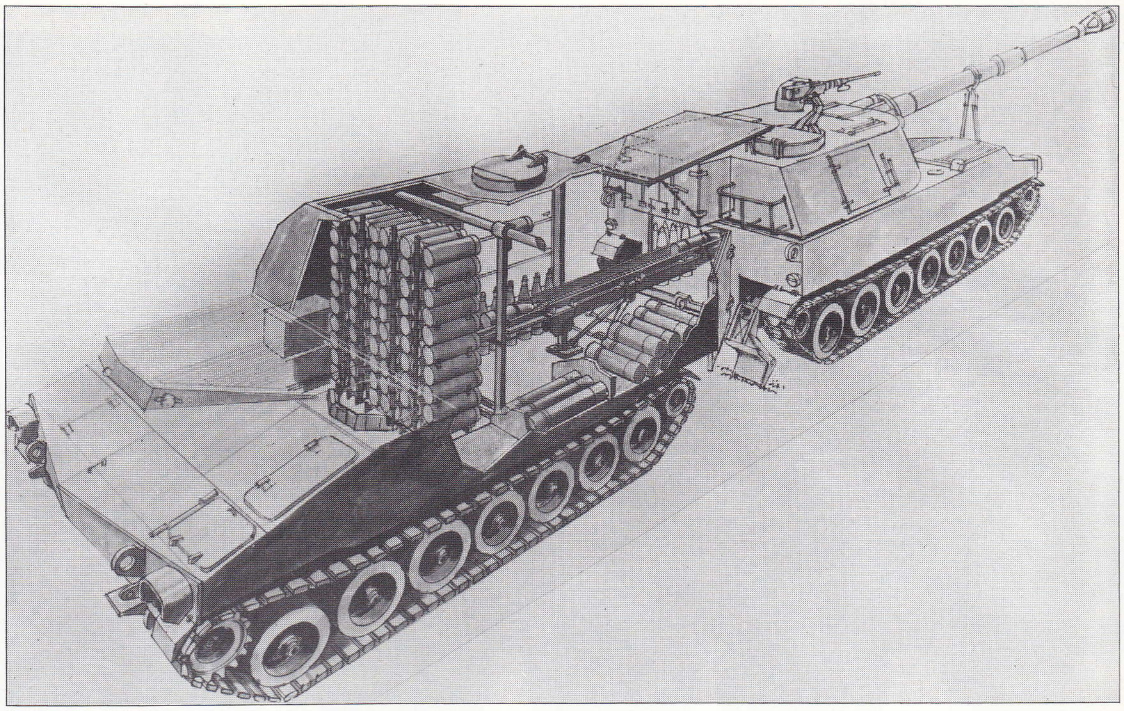






USA

M992 Field Artillery Ammunition Support Vehicle



An M992 attends a US Army M109 SP 155-mm gun. In US service it carries 93 155-mm shells, 99 propellant charges and 104 fuses. The vehicle can also be used to support the M110A2 203-mm SP howitzer.

Until the introduction of the **M992 Field Artillery Ammunition Support Vehicle** into the US Army, the 155-mm (6.10-in) M109 self-propelled howitzer was resupplied in the forward battlefield area by M548 tracked cargo carriers which lack armour protection for crew and cargo.

In 1979 the US Army tested three prototypes of a full-tracked armoured ammunition resupply vehicle. Two of these were based on the proven M109 chassis (one built by BMY and the other by AAI/Human Engineering Laboratory) and the last on an FMC stretched M548 cargo carrier chassis.

After extensive trials the M109 chassis was selected in preference to the M548 chassis for a number of reasons, including its commonality with the M109 self-propelled howitzer which it would support in the field. For the US Army this offered a number of advantages including easier training and logistic support.

After trials with prototype vehicles designated **XM992**, the vehicle was accepted for service with the US Army and type classified as the M992 Field Artillery Ammunition Support Vehicle (FAASV).

The first production order for the M992 was placed with Fiscal Year 1983 funding, the first production vehicles being completed in 1984. By the end of 1984 38 vehicles had been completed, with another 185 following in 1985. The US Army has a requirement for some 1,500 vehicles of this type.

The M992 is also in service with Egypt, which additionally operates a command post vehicle based on the same chassis. This has been ordered by Saudi Arabia.

The basic hull of the M99 is almost identical to that of the M109 with which it is designed to operate. To the rear of the driver's compartment and engine, the turret has beeen replaced by a fully enclosed compartment of welded aluminium armour that provides the same degree of protection as that offered to the remainder of the vehicle.

In the roof of the ammunition compartment is a commander's cupola which can be traversed through 360° and is fitted with an externally mounted 12.7-mm (0.5-in) M2HB machine-gun for local protection.

In the ammunition resupply compartment are racks for projectiles, which are loaded through hatches in the roof. Prototype XM992s had a hydraulic crane mounted on the hull front to enable the vehicle to resupply itself direct from trucks, but production vehicles for the US Army lack this crane, although it was specified by Egypt. The M992 also carries the appropriate propellant charges and fuses. In US Army service the M992 carries 93 155-mm projeciles, 99 propellant charges and 104 fuses. The vehicle can also be configured to support the M110A2 203-mm (8-in) self-propelled howitzer, in which case it carries 43 projectiles, 53 propellant charges and 56 fuses.

In action the M992 backs up to the rear of the M109 self-propelled howitzer and transfers fused projectiles and propellant charges directly into the rear of the M109 via a conveyor system at six rounds per minute, a rate somewhat higher than the normal rate of fire of the M109.

BMY has suggested that the M992 could be the basis of a complete family of tracked and armoured supporting vehicles, inluding a **Maintenance Assist Vehicle, Armored Forward Area Rearm Vehicle, Fire Direction Center** (already tested by the US Army) and **Medical Evacuation Vehicle**.

Specification

M992

Crew: 2+6

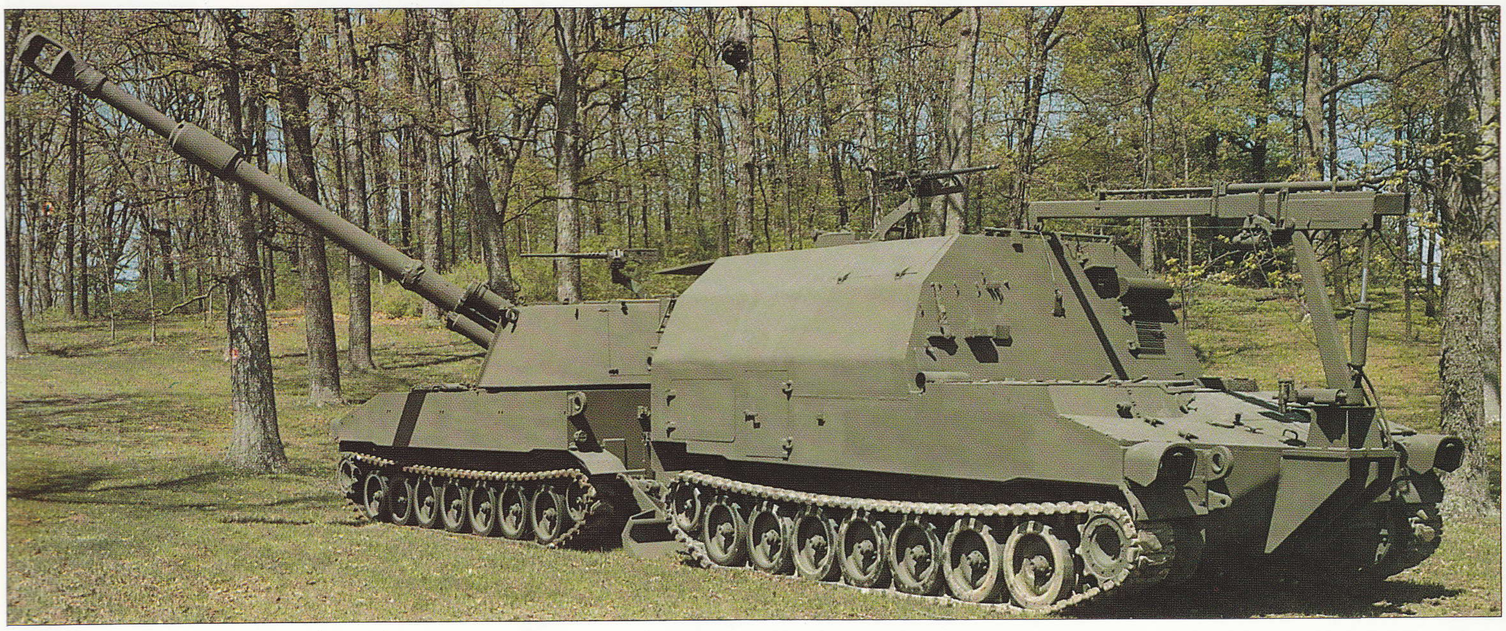
Weights: empty 20000 kg (44,092 lb); loaded 26136 kg (57,619 lb)

Powerplant: one Detroit Diesel Model 8V-71T 8-cylinder turbocharged diesel devloping 302 kW (405 bhp)

Dimensions: length 6.78 m (22 ft 3 in); width 3.25 m (10 ft 8 in); height 3.20 m (10 ft 6 in)

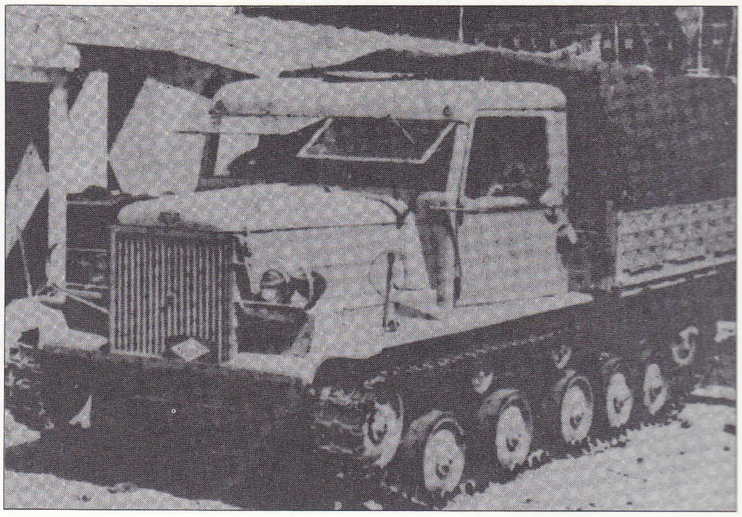
Performance: maximum road speed 57.5 km/h (36 mph); range 360 km (224 miles); fording 1.07 m (3 ft 6 in); trench 1.83 m (6 ft 0 in); gradient 40 per cent; side slope 20 per cent

The M992 Field Artillery Ammunition Support Vehicle supplies 155-mm projectiles and propellant charges to the US Army's M109 self-propelled artillery batteries, replacing the lightly protected M548 in this role. The chassis is also used by the Egyptian army as an armoured, mobile command post.



HUNGARY

K-800 Light Tracked Artillery Tractor



The K800 is an up-engined M2, which was a light artillery tractor based on the Su-76 chassis introduced by the Soviet Union in the late 1940s. Now retired from first-line Hungarian units, the K800 is probably still in reserve.

Shortly after the end of World War II the USSR produced the M-2 light artillery tractor as the replacement for the Ya-12 and Ya-13F light artillery tractors introduced towards the end of the war. In the Soviet army the M-2 was replaced from the early 1950s by the AT-L vehicle.

In the 1950s Hungary introduced the **K-800** light tracked artillery tractor, which is almost identical to the Soviet M-2 but has a more powerful engine. As far as it is known the K-800 is no longer in front-line service with the Hungarian army, although quantities are doubtless held in reserve as the Warsaw Pact rarely scraps obsolescent military equipment, such items being put into store or exported to Africa or elswhere.

The water-cooled diesel engine is coupled to a manual transmission with five forward and one reverse gear, and is mounted at the front. The two-man fully enclosed cab is located in the centre, and has single observation hatch in the roof and two windscreens hinged on the upper part to open forwards.

The rear cargo area has a drop tailgate, removable bows and a tarpaulin cover. Suspension is almost identical to that installed on the Su-76 76-mm (3-in) self-propelled gun, with five single-tyred road wheels, the drive sprocket at the rear and the idler at the front, and three track-return rollers.

The K-800 can carry a maximum payload of 1800 kg (3,968 lb) and tow a weapon or trailer weighing up to 8000 kg (17,637 lb)

Many years ago Yugoslavia built a version of the K-800 called the **GJ-800**. This was similar in appearance to the Hungarian vehicle but powered by a 6-cylinder water-cooled diesel developing 89 kW (120 hp) and fitted with a cab from a standard FAP truck also built in Yugoslavia.

Specification

K-800

Crew: 1+1

Weights: empty 6400 kg (14,109 lb); loaded 8200 kg (18,078 lb)

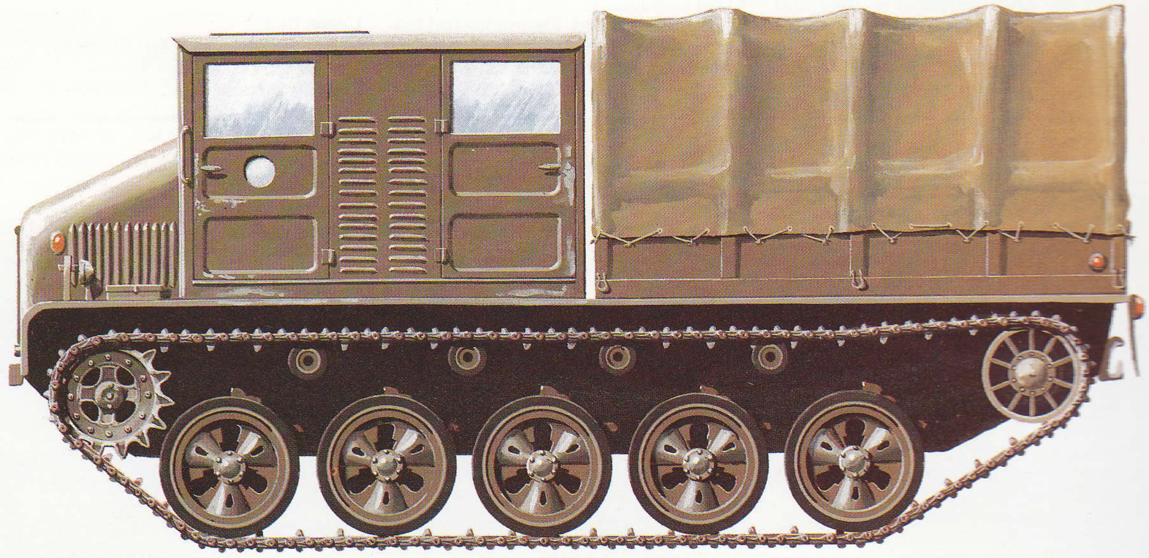
Powerplant: one Csepel D613 6-cylinder water-cooled diesel developing 97 kW (130 hp)

Dimensions: length 5.0 m (16 ft 4.8 in); width 2.40 m (7 ft 10.5 in); height, cab roof 2.20 m (7 ft 2.6 in)

Performance: maximum road speed 35 km/h (22 mph); range 300 km (186 miles); fording 0.6 m (2 ft 0 in); vertical obstacle 0.5 m (1 ft 8 in); trench 1.5 m (4 ft 11 in); gradient 60 per cent; side slope 30 per cent

POLAND

Mazur D-350 Medium Tracked Artillery Tractor



The Mazur D-350 is the Polish equivalent of the Soviet ATS-59 and offers better crew comfort than the Soviet vehicle.

The **Mazur D-350** medium tracked artillery tractor was designed and built at the Labedy Heavy Machinery Plant in Poland in the 1950s, and performs a role similar to that of the Soviet AT-S medium tracked artillery tractor.

The first prototypes were called **Mazur D-300**, but these were underpowered and production vehicles were fitted with a more powerful engine and renamed Mazur D-350.

As far as it is known the Mazur D-350 has been used only by Czechoslovakia and Poland to tow 85-mm (3.35-in) and 100-mm (3.94-in) anti-tank guns, and also 122-mm (4.80-in) and 152-mm (5.98-in) guns and howitzers.

The Mazur D-350 can tow a weapon or trailer weighing up to 10000 kg (22,046 lb) across country or 15000 kg (33,069 lb) on roads.

Most reports state that the Mazur D-350 was replaced in production at the Labedy Heavy Machinery Plant by the Soviet ATS-59 medium tracked artillery tractor, but this could well have been specifically for 'the export market.

The V-12 water-cooled diesel engine is mounted at the front of the vehicle and coupled to a manual gearbox with five forward and one reverse gear.

The fully enclosed four-door cab is to the rear of the engine and has seats for the driver and eight passengers, for example the complete gun crew when the vehicle is towing an artillery weapon. This is a significant improvement over the Soviet ATS-59, in which most of the gun crew are seated in the rear area, exposed to the elements or just provided with a tarapaulin cover. The Mazur D-350's cab also has an observation hatch in the roof and the two front windscreens are hinged at the top so that they can be opened for improved visibility or cooling in hot weather.

The rear cargo area is provided with high sides, a drop tailgate, removable bows and a tarpaulin cover. Standard equipment includes a winch with a capacity of 17000 kg (37,478 lb) and 80 m (262 ft) of cable.

Suspension is of the torsion-bar type with five road wheels; the drive sprocket is at the front and the idler at rear, and four small track-return rollers are fitted.

Specification

Mazur D-350

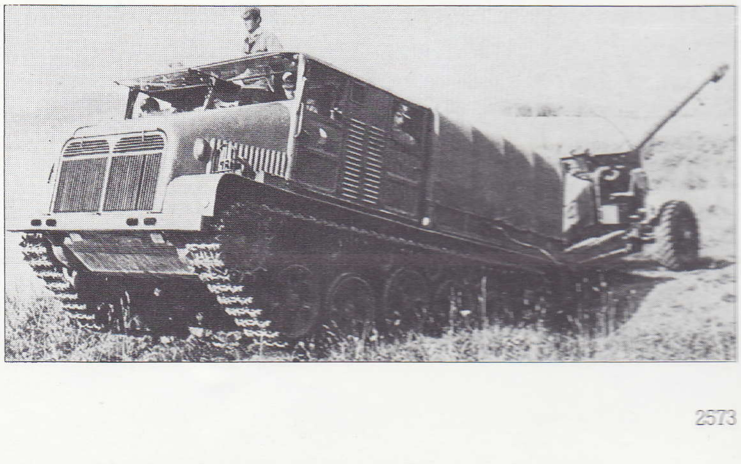
Crew: 1+8

Weights: loaded road 18560 kg (40,918 lb) and loaded cross-country 17060 kg (37,611 lb)

Powerplant: one D-350 V-12 water-cooled diesel developing 261 kW (350 hp)

Dimensions: length 5.81 m (19 ft 0.75 in); width 2.89 m (9 ft 5.8 in); height, cab roof 2.60 m (8 ft 6.4 in)

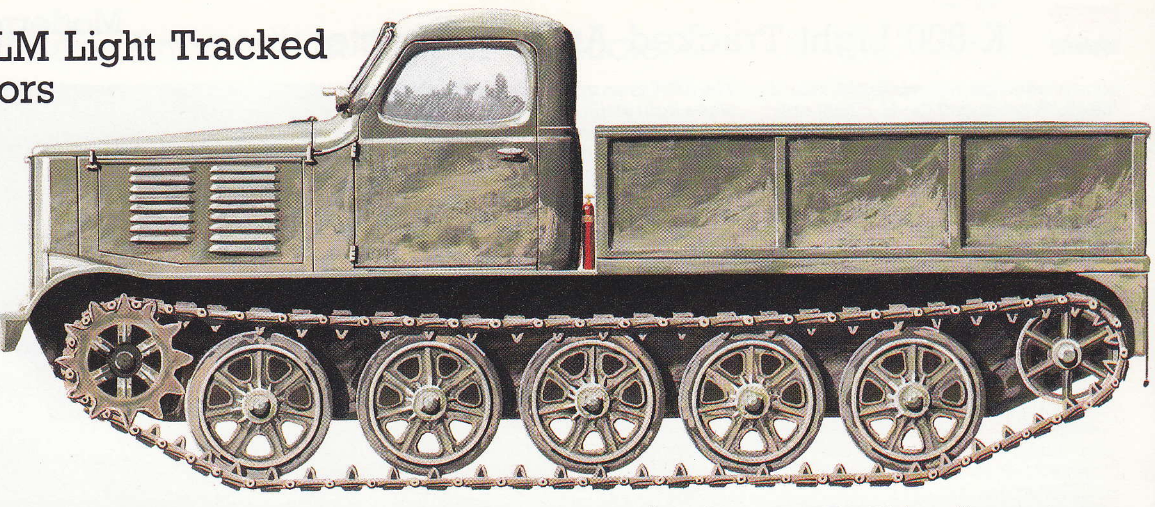
Performance: maximum road speed 53 km/h (33 mph); range 490 km (304 miles); fording 0.8 m (2 ft 8 in); vertical obstacle 0.6 m (2 ft 0 in); trench 1.45 m (4 ft 9 in); gradient 50 per cent; side slope 20 per cent



Seen here towing an M53 100-mm (3.9-in) gun, the Mazur D-350 is capable of towing a weapon or trailer of up to 10 tonnes across country or 15 tonnes along a road.

USSR

AT-L and AT-LM Light Tracked Artillery Tractors



The AT-LM light artillery tractor was introduced in the mid-1950s and has been widely exported to the Soviets' sometime allies in the Middle East, Egypt and Syria. Typical weapons towed include large mortars of 160-mm and 240-mm calibres as well as 122-mm and 152-mm howitzers.

The **AT-L** was developed in the period immediately after World War II as the replacement for the older M-2 light tractor, and first entered service in 1953.

The AT-L has a maximum payload of 2000 kg (4,409 lb) and can tow a trailer or artillery weapon weighing up to 6000 kg (13,228 lb). Typical weapons towed by the AT-L include 160-mm (6.30-in) and 240-mm (9.45-in) mortars, anti-tank guns, and 122-mm (4.80-in) and 152-mm (5.98-in) towed guns and howitzers.

The engine and radiator of the AT-L are mounted at the front of the vehicle for ease of access for maintenance purposes. The two-door fully enclosed cab is to the rear of the engine, and the cargo area is at the very rear. The latter is provided with sides, a drop tailgate, removable bows and a tarpaulin cover. When the AT-L is towing artillery, the members of the gun crew normally sit on bench seats running across the full width of the vehicle.

The suspension of the AT-L is of the torsion-bar type with six road wheels; the idler is at the rear and the drive sprocket at front, and there are three track-return rollers.

In the mid-1950s the **AT-LM** was introduced. This is similar to the original AT-L but has five large road wheels, with the drive sprocket at front and idler at rear; there are no track-return rollers.

The AT-L and AT-LM were widely used by most members of the Warsaw Pact and exported to such countries as Egypt and Syria. In most Soviet front-line units they have now been replaced by 6×6 trucks.

The AT-L and AT-LM are used for carrying a variety of specialized electronic equipment such as the 'Small Yawn' (ARSOM-2) counter-mortar/counter-battery radar, and the 'Long Trough' and 'Pork Trough' (SNAR-2) battlefield surveillance radars.

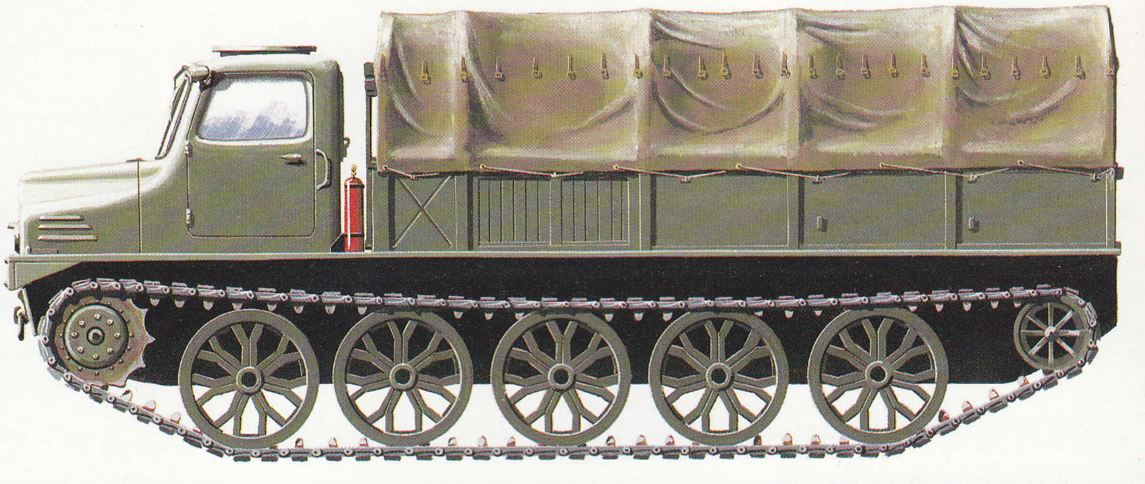
The AT-L and AT-LM can both be fitted with an OLT dozer blade at the front of the vehicle, and this can be used for a variety of roles such as clearing soil and obstacles or preparing firing positions for other weapons and armoured vehicles. Depending on the terrain conditions, the AT-L/AT-LM generally carries out dozing operations at a speed of 4 to 6 km/h (2.5 to 3.7 mph), and can move 40 m^3 (1,413 cu ft) per hour, though this latter figure depends very much on the actual soil conditions, and is reduced in frozen ground.

The USSR also produced an armoured tracked artillery tractor called the **AT-PM**. The first prototype of this was completed in 1944 but it did not enter service for several years. In addition to towing field guns and howitzers it was also used to tow anti-tank guns such as the 100-mm (3.94-in) T-12.

Specification
AT-L
Crew: 1+2
Weights: empty 6300 kg (13,889 lb); loaded 8300 kg (18,298 lb)
Powerplant: one YaMZ-204VKr 4-cylinder water-cooled diesel developing 261 KW (350 hp)
Dimensions: length 5.81 m (19 ft 0.75 in); width 2.89 m (9 ft 5.75 in); height, cab roof 2.60 m (8 ft 6.4 in)
Performance: maximum road speed maximum road speed 42 km/h (26 mph); range 300 km (186 miles); fording 0.6 m (2 ft 0 in); vertical obstacle 0.6 m (2 ft 0 in); trench 1.0 m (3 ft 3 in); gradient 50 per cent; side slope 20 per cent

USSR

ATS-59 Medium Tracked Artillery Tractor



The ATS-59 is distinguishable from the AT-T heavy artillery tractor by its much shorter bonnet. Intended to tow the M-46 130-mm field gun and the KS-19 100-mm AA gun, it has been largely replaced in front-line Soviet units by heavy trucks.

The **ATS-59** medium tracked artillery tractor entered service with the Soviet army in the 1950s to supplement the older AT-S medium tracked artillery tractor. The vehicle can tow trailers or weapons weighing up to 14000 kg (30,865 lb) and carry a maximum payload, such as ammunition or stores, up to 3000 kg (6,614 lb). Types of artillery weapons towed include the 130-mm (5.12-in) M-46 field gun and the 100-mm (3.94-in) KS-19 towed anti-aircraft gun. In most front-line Soviet units the ATS-59, like other vehicles of this type, has been replaced by 6×6 cross-country vehicles for economic and logistical reasons.

In addition to being built in the USSR, the ATS-59 has also been made at the Labedy Heavy Machinery Plant in Poland, which also developed its own medium tracked artillery tractor called the Mazur D-350. In addition to being used by members of the Warsaw Pact, the ATS-59 has been supplied to armies in Africa and the Middle East.

The all-steel two-man fully enclosed cab is at the front of the vehicle, and has an observation hatch in the left side of the roof. In appearance the ATS-59 is very similar to the AT-T heavy tracked artillery tractor; the latter is slightly larger and has a much deeper bonnet.

The rear cargo area of the ATS-59 is provided with high sides, a drop tailgate, removable bows and a tarpaulin cover. When the vehicle is being used to tow an artillery pieces the members of the gun crew are normally seated on bench seats that run across the full width of the cargo area.

Unlike that of the AT-T, the engine of the ATS-59 is mounted to the rear of the cab and protrudes into the rear cargo area, thereby limiting the size of cargo that can be carrried.

Suspension is of the torsion-bar type and consists of five dual rubber-tyred road wheels, with the drive sprocket at the front and the idler at the rear; there are no track-return rollers. The basic vehicle has a range of 350 km (217 miles), but with long-range fuel tanks this can be increased to 500 km (311 miles), a very useful feature when fuel resupply vehicles are scarce.

In Soviet army service the ATS-59 was replaced by the **ATS-59G**, which has similar suspension but a new fully enclosed forward control cab somewhat similar in appearance to that of the AT-S medium tracked artillery tractor. This too is rarely seen today within the Soviet army.

There are several variants of the ATS-59 including a tractor model (rear cargo area removed and replaced by a fifth wheel for towing semi-trailers) and a dozer vehicle. The latter is fitted with a hydraulically operated dozer blade at the front of the hull for clearing earth, snow and contaminated soil, and for preparing obstacles and fire positions.

Specification
ATS-59
Crew: 1+1
Weights: empty 13000 kg (28,660 lb); loaded 16000 kg (35,274 lb)
Powerplant: one Model A-650 V-12 water-cooled diesel developing 224 kW (300 hp)
Dimensions: length 6.28 m (20 ft 7.2 in); width 2.78 m (9 ft 1.4 in); height (cab) 2.30 m (7 ft 6.6 in)
Performance: maximum road speed 39 km/h (24 mph); range 350 km (217 miles); fording 1.5 m (4 ft 11 in); vertical obstacle 1.1 m (3 ft 7 in); trench 2.5 m (8 ft 2 in); gradient 50 per cent; side slope 20 per cent

The Northern Threat

The majority of Soviet first-line divisions no longer use tracked prime movers, as their artillery is now entirely self-propelled. Yet the giant tractors would have an important role to play in a future conflict, equipping the second-echelon formations and, in the case of the AT-T, towing the massive 180-mm guns of the heavy artillery battalions.

According to the latest Western intelligence estimates, the Soviet ground forces number just under two million officers and men organized into 51 tank divisions, 141 motorized rifle divisions, seven airborne divisions, 16 artillery divisions, eight air assault brigades, 16 Spetsnaz brigades plus many smaller artillery, tank, surface-to-surface missile, electronic warfare, NBC defence, signals, anti-tank, anti-aircraft, artillery brigades and regiments.

Three categories

These divisions have three states of combat readiness: Category 1, 2 and 3. Category 1 formations are kept up to full strength in both manpower and equipment at all times, and are therefore ready for almost instant combat after drawing ammunition, fuel and other essential supplies.

Category 2 formations have their full scale of equipment but only 50 to 70 per cent of their manpower. They therefore require three days to reach full manpower strength from reserves upon mobilization.

Category 3 formations have their full scale of equipment but this is often older material such as T-54/T-55 tanks and towed 122-mm (4.8-in) and 152-mm (6-in) artillery pieces rather than the more modern self-propelled weapons. These divisions have only about 20 per cent of their required manpower and require some eight to 10 weeks to attain combat strength and reach their deployment areas.

All of the divisions in Eastern Europe are Category 1 formations, those in the European USSR are a mixture of Category 1 and 2, and most in the central and southern USSR and in the Far East except those on the Chinese border are Category 3.

Reduced use of tracked prime movers

Recent tables of organization and equipment (TOE) of Soviet tank and motorized rifle divisions show that they no longer have any full tracked unarmoured prime movers as all of their artillery is now self-propelled (122-mm 2S1 and 152-mm 2S3).

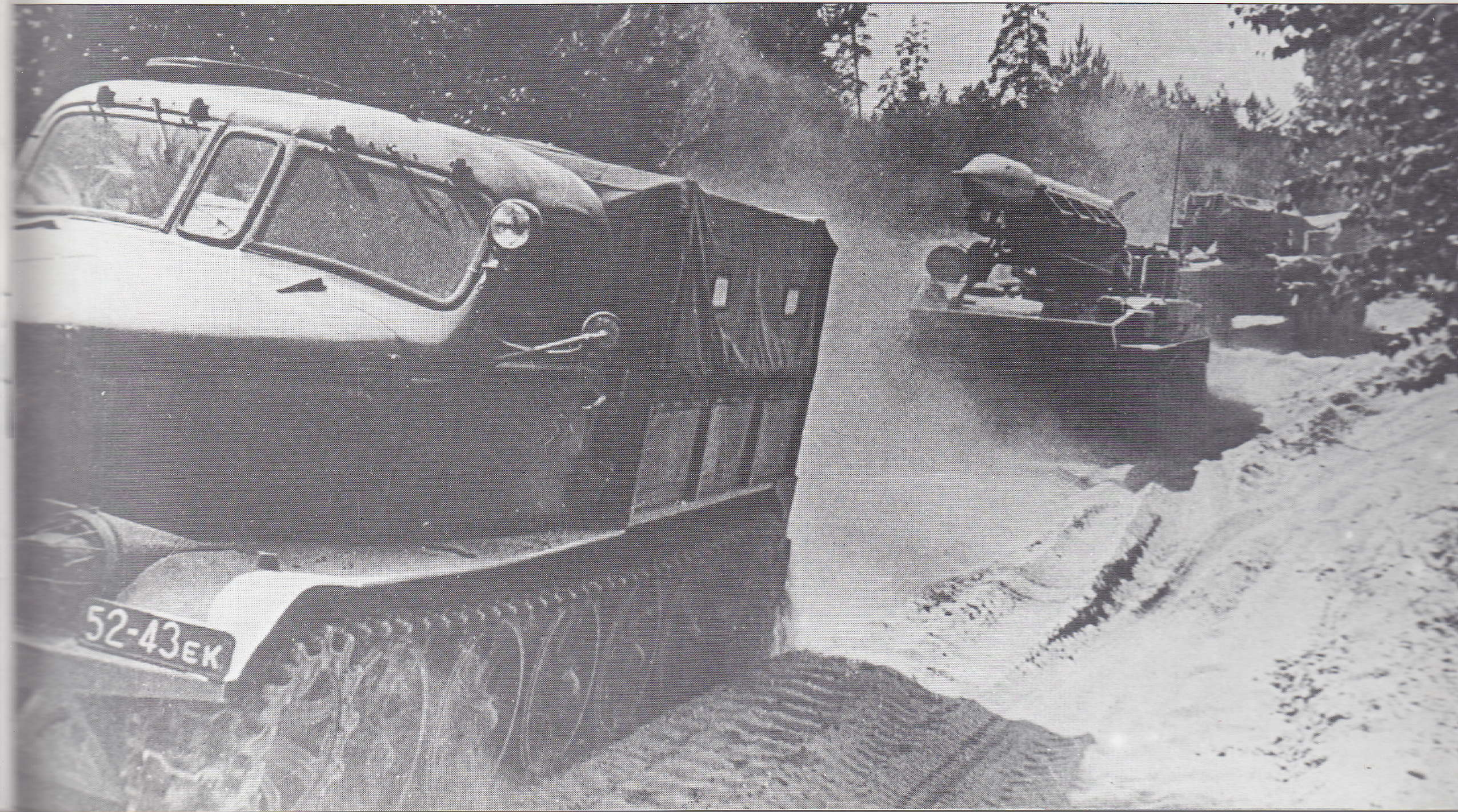
The motorized rifle division does, however, have one AT-S tractor in the maintenance battalion while ditching and dozer versions of the AT-T are distributed throughout the division. The motorized rifle division also include an anti-tank battalion (not found in the tank division) with 14 MT-LB armoured tracked prime movers, 12 of which are used to tow the 100-mm (3.94-in) T-12 anti-tank guns. The tank division also has the single AT-S and the ditching and dozer versions of the AT-S.

While Category 1 divisions do not employ tracked prime movers on a large scale, the Category 2 and 3 divisions would probably use them in significant numbers to tow their 122-mm and 152-mm artillery as insufficient self-propelled artillery weapons have been produced to equip all Category 1 divisions of the Soviet army, let alone Category 2 and 3 divisions.

They would also be used to tow some of the large numbers of 57-mm (2.24-in), 85-mm (3.34-in), 100-mm (3.94-in), and 130-mm (5.11-in) anti-aircraft guns which are held in reserve in significant numbers and would be used to supplement the extensive network of highly effective SAM systems, both mobile and semi-static such as the SA-2 'Guideline' and SA-3 'Goa'.

In a conflict between NATO and the Warsaw Pact powers Norway would be of primary strategic importance. The Norwegian army has a peacetime strength of only 19,500, which would rise to 165,000 on full mobilization. Here a Norwegian infantryman is on exercise away from the sensitive frontier with the Soviet Union.

Although tracked prime movers have been replaced by 6×6 trucks in most Category 1 readiness Soviet divisions, they will be seen for a long time yet in the Category 2 and 3 formations, towing 122-mm and 152-mm guns and howitzers. Over snow the tracked vehicles would have superior mobility despite their age.



The Northern Threat

Over rough and snow-covered terrain, the full-tracked prime mover can tow field guns at a higher cross-country speed than normal 6×6 trucks and their ground pressures are much lower.

The main threat to NATO from the Warsaw Pact is commonly believed to be only against the Central Front, specifically West Germany. But many believe that the threat to NATO's flanks is greater, especially the northern flank, where Norway shares a border with the USSR.

Many years ago NATO recognized that a war in Europe was just as likely to start on the flanks of NATO as on the Central Front, and for this reason the Allied Command Europe Mobile Force (or ACE Mobile Force) was formed.

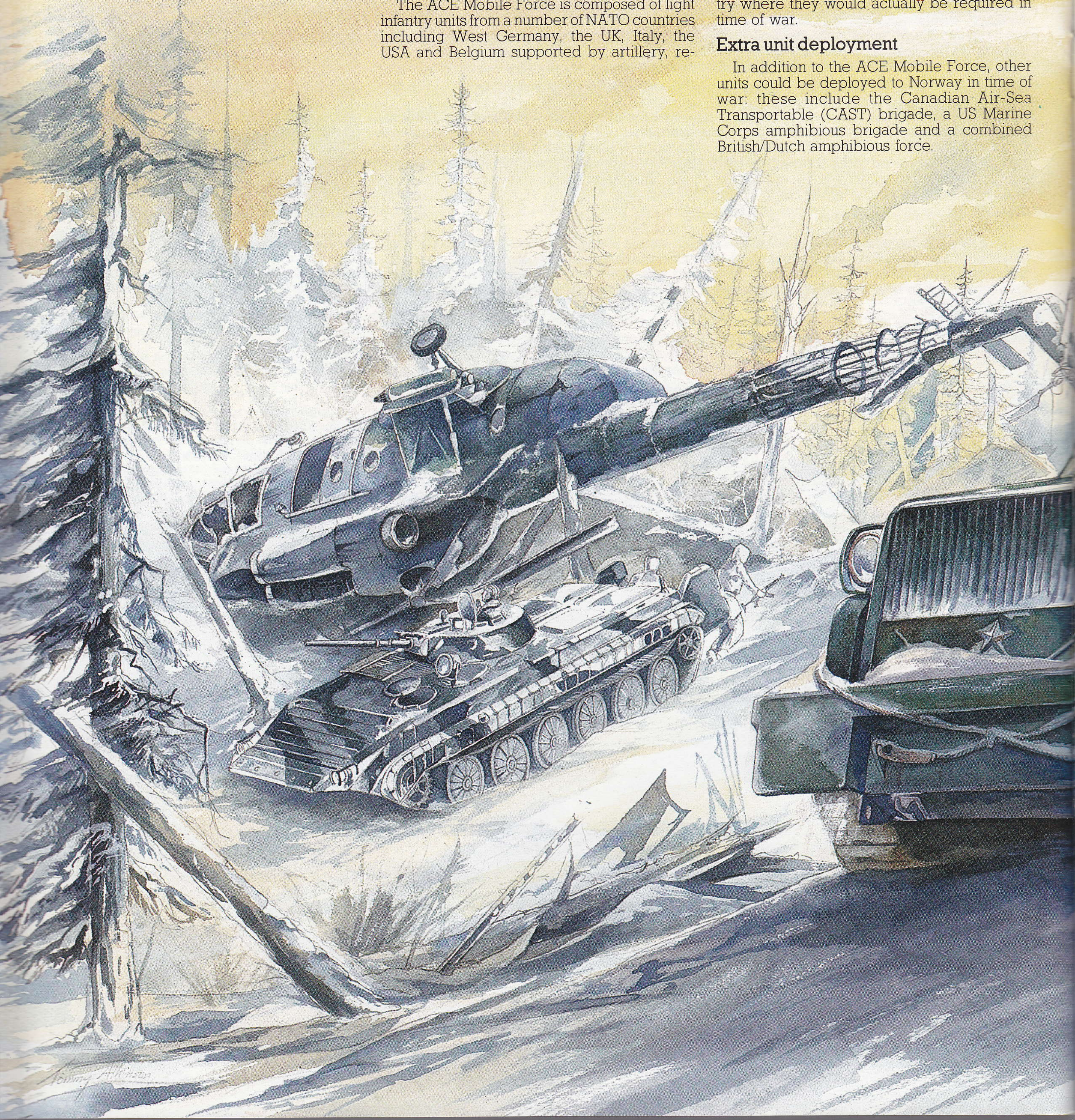
This is trained to fight on the flanks of NATO from the extreme cold of Norway to the usually more warmer climate of Greece and Turkey.

The ACE Mobile Force is composed of light infantry units from a number of NATO countries including West Germany, the UK, Italy, the USA and Belgium supported by artillery, reconnaissance, transport helicopters and ground-attack aircraft. The ACE Mobile Force carries out numerous exercises on both flanks of NATO on a regular basis as well as exercising in other member countries.

For political reasons Norway does not allow any permanent NATO units to be stationed within its borders, although it has recently allowed the USA to store equipment for a brigade in southern Norway, although the Norwegian military authorities recommended that they should be placed in the north of the country where they would actually be required in time of war.

Extra unit deployment

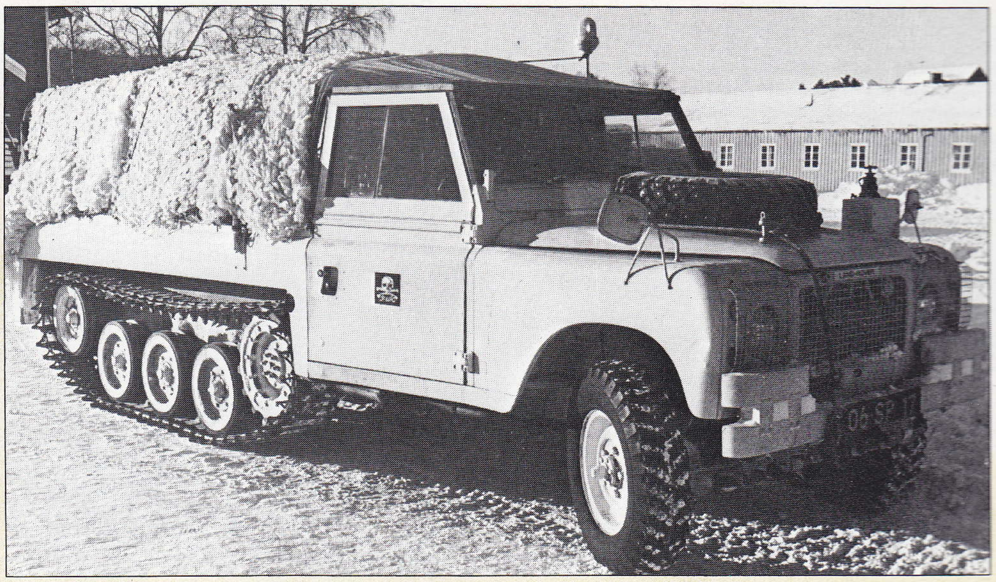
In addition to the ACE Mobile Force, other units could be deployed to Norway in time of war: these include the Canadian Air-Sea Transportable (CAST) brigade, a US Marine Corps amphibious brigade and a combined British/Dutch amphibious force.



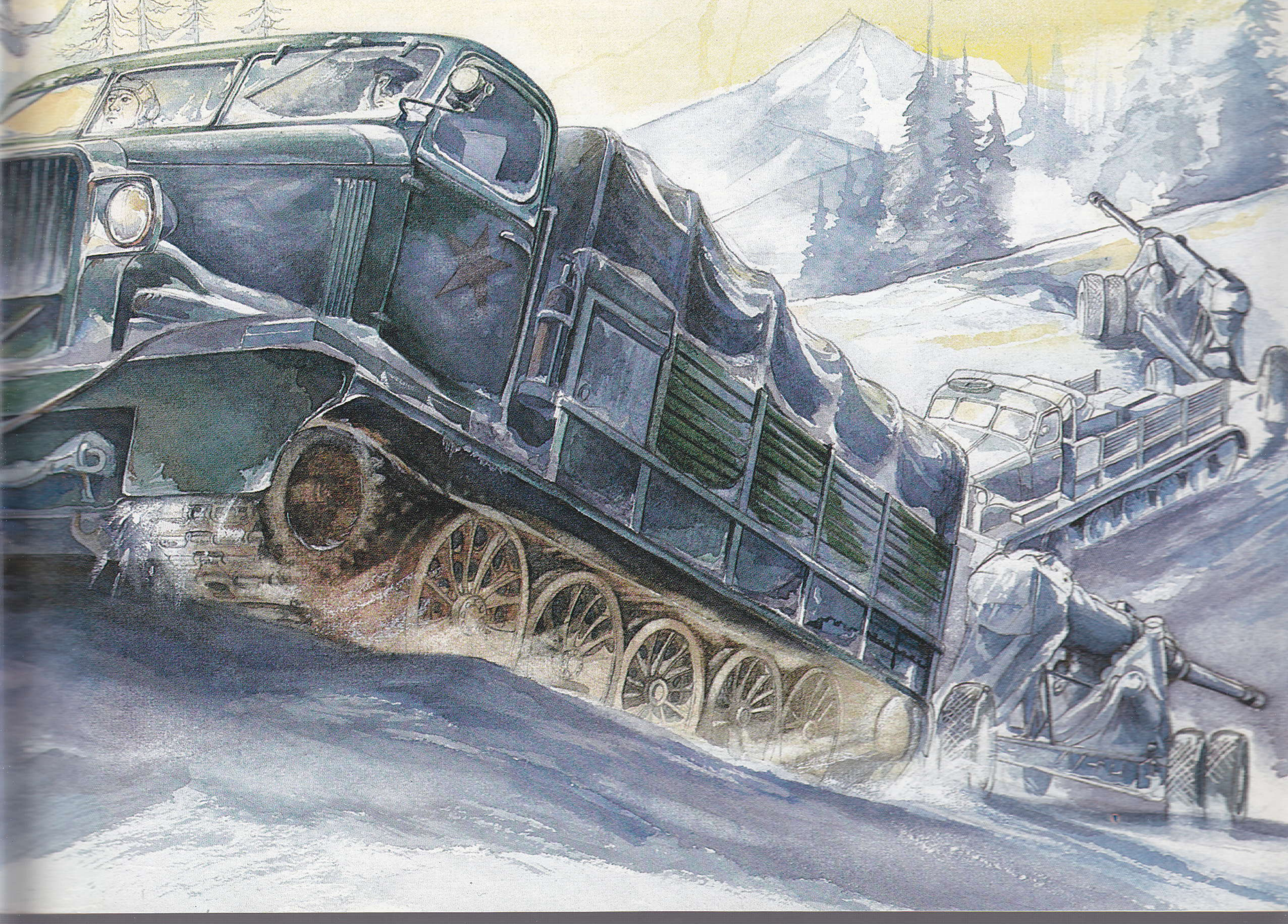
The climate in Norway is such that units have to be trained to operate in the invariably harsh environment, and for this reason the ACE Mobile Force trains in Norway while the combined British/Dutch amphibious force trains in the country for at least three months per year. For political reasons these forces do not train near the Norwegian/Soviet border where they would be deployed in time of war.

In peacetime there is one brigade group in northern Norway: this consists of three infantry battalions, one tank company, one 155-mm (6.1-in) M109 self-propelled artillery battalion, one anti-aircraft battery plus support units. To the western rear of the Norwegian/Soviet border is a single infantry battalion. In time of war two further Norwegian brigades would be formed locally and another two flown up from southern Norway, with perhaps a further two brigades being provided by NATO. Rapid reinforcement by air would depend on the airfields in northern Norway being kept open.

The Soviet Kola peninsula opposite Norway comes under the Leningrad Military District,



Above: A Centaur of the 17/21 Lancers is seen on exercise in northern Norway. The Allied Command Europe (ACE) Mobile Force trains for three months a year in Norway to hone its ability to fight in the harsh Norwegian climate. Norway has political cold feet about allowing NATO units to be indefinitely stationed within her borders.



Below: The Russian army has always placed great value on its artillery, and the modern Soviet forces have a formidable array of guns with which to blast a gap in enemy defences. Here the mighty AT-T heavy artillery tractor tows an S-23 180-mm gun, following hard on the heels of Soviet units advancing into Norway. Its 508-mm wide tracks give it a respectable low ground pressure even when hauling the 21-tonne gun. To the left, the crew of a BMP examine the wreckage of a Mil-8 helicopter.

whose headquarters are in Leningrad itself with 6th Army headquarters at Petrozavodsk and corps headquarters at Arkhangelsk and Viborg.

Soviet forces are believed to comprise one airborne division (the 76th Guards based at Pskov), one artillery division, eight or nine motorized rifle divisions, one or two air assault regiments and the 63rd Naval Infantry Brigade based at Petsamo.

Of the above, two motorized rifle divisions (the 45th in the Murmansk area and the 341st in the Alakurtti area), the air assault regiments, the 63rd Naval Infantry Brigade and some artillery units are in the Kola peninsula. All of these units are at Category 1 or 2 status, and thus can move at very short notice without the need to wait for reinforcements.

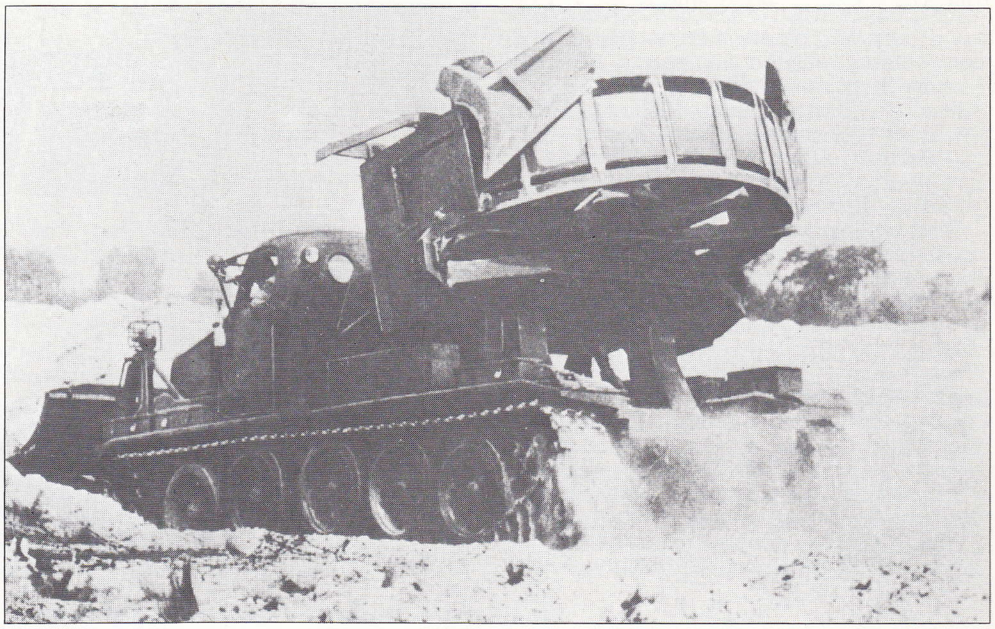
They would, however, soon have to be reinforced by units currently south of the Leningrad Military District, most of which are Category 2 or 3 status, so hopefully NATO intelligence would be able to detect any sudden military build-up and rush reinforcements to Norway, provided that the political decision was taken early enough.

The Soviet ground forces are backed by substantial air and naval assets. Although many of the air assets are based to the south of the Kola peninsula, they can be flown into the area at very short notice. Many of the airfields in the Kola peninsula have been improved in recent years; runways have been extended and strengthened, communications systems have been upgraded, about 500 hardened aircraft shelters have been installed, and air defences strengthened and improved with many SA-6 'Gainful' launchers supplementing numbers of older SA-2 'Guideline', SA-3 'Goa' and SA-5 'Gammon' types. New SA-10 'Grumble' and SA-12 'Gladiator' missiles are also probably now being employed to replace some of the older missile systems.

This area is vital to the USSR as over 60 per cent of the Soviet surface fleet is believed to operate from this area: the Northern Fleet headquarters are at Severomorsk, and over 60 per cent of the nuclear ballistic submarines and a slightly smaller proportion of conventional and nuclear attack submarines are based in the region. The majority of the submarine bases in this area are to the west of Murmansk. Communications are such that most of the supplies to these bases have to be brought in by air or sea.

Naval Aviation is also employed in the Kola peninsula in significant numbers, including almost 100 Tupolev Tu-16 'Badgers' and Tu-22 'Blinders', 30 fixed-wing anti-submarine warfare aircraft, about 100 anti-submarine warfare helicopters and 80 specialized reconnaissance aircraft, including some dedicated to electronic warfare. In addition there are also transport and training aircraft.

There are no strategic bomber aircraft based in the Kola peninsusla on a full-time basis, although Myasishchev M-4 'Bison' and 'Badger' bombers do visit airfields on a regular basis and in time of war would use these bases to refuel on their way to attack the continental United States. There has been speculation that the new Tupolev 'Blackjack' bomber may be based in this area.

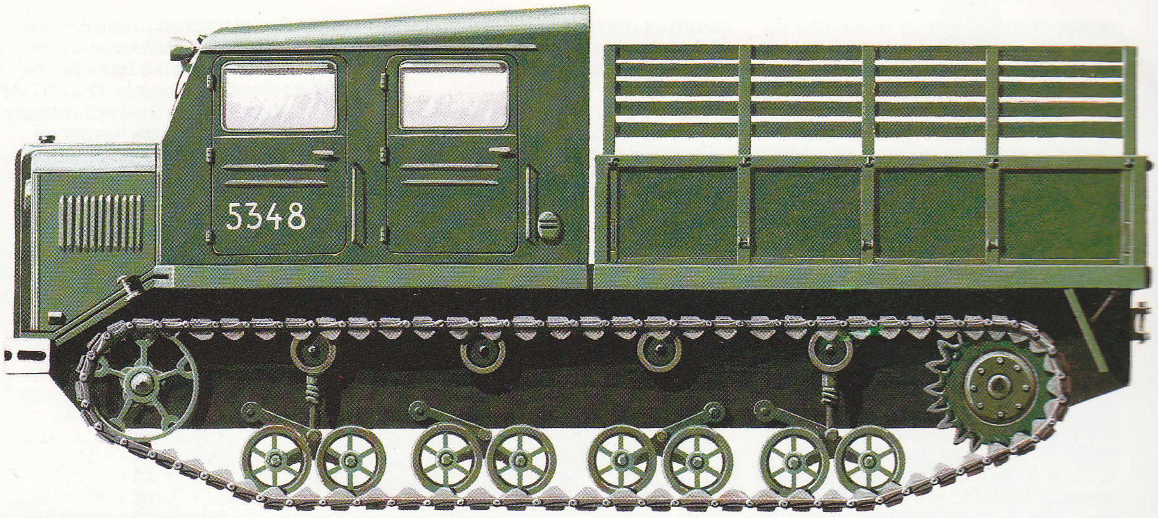


The AT-T tractor is also used to carry the MDK-2 pit-digging machine, which swings 90° to the vertical for ditching operations. In good conditions the MDK-2 can dig at a rate of 300 m^3 per hour, excavating a ditch 4.5 m deep and 3.5 m wide at the bottom. On the front of the tractor is an OTT dozer blade.

The best main battle tank in the Norwegian army is the Leopard 1, armed with a 105-mm (4.13-in) gun. Seventy-eight of these vehicles were delivered from 1969-71, together with six ARV models. Norway also fields 30 M48A5s with 105-mm guns and 70 NM-116s – indigenously modified M24 Chaffee light tanks carrying 90-mm (3.54-in) guns.

USSR

AT-S Medium Tracked Artillery Tractor



Above: The AT-S medium artillery tractor entered service with the Red Army in the early 1950s and was subsequently supplied to all members of the Warsaw Pact except Czechoslovakia.

The AT-S is used by the Finnish army in small numbers. Able to tow trailers or weapons weighing up to 16 tonnes, it can carry up to three tonnes on the rear cargo area. The chassis was used as the first mounting for the BM-24 12 round 240-mm (9.45-in) MRLS.

The **AT-S** medium tracked artillery tractor was developed in the 1940s and entered service with the Soviet army in the early 1950s, but was subsequently replaced by the ATS-59 medium tracked artillery tractor. In addition to its use with the Soviet army, the AT-S has also been used by every member of the Warsw Pact with the exception of Czechoslovakia, and exported to such countries as China, Egypt, Finland, Syria and Yugoslavia. It is rarely seen in front-line Warsaw Pact service today, having been replaced by cross-country trucks.

The AT-S can carry a maximum payload of 3000 kg (6,614 lb) and tow trailers or weapons weighing up to 16000 kg (35,274 lb). Typical weapons include 100-mm (3.94-in) KS-19 anti-aircraft guns and 152-mm (5.98-in) howitzers.

The engine is mounted under the fully enclosed four-door cab at the front of the hull. The cab has seats for the driver and six passengers, which means that when the AT-S is towing heavier weapons the remainder of the gun crew are seated in the rear cargo area. The latter has high sides, a drop tailgate, removable bows and a tarpaulin cover.

Suspension on each side consists of four pairs of twin-wheel bogies, an idler at the front and a drive sprocket at rear, and four track-return rollers.

The AT-S was also used as the basis for the BM-24T multiple rocket-launcher, which had a 12-round 240-mm (9.45-in) multiple rocket-launcher mounted on the rear, but as far as it is known this version is no longer in service. The rocket-launcher was also mounted on a ZIL-157 6×6 cross-country truck chassis, and this remains in service with many countries and is even used by the Israeli army with locally manufactured rockets.

For oversnow use the **SBKh** was developed from the AT-S. This has different suspension and a much wider track for lower ground pressure and thus improved performance on snow-covered terrain.

The **OST** is an AT-S fitted with dozer blade at the front of the hull, this blade arrangement being the same as that fitted to the ATS-59 vehicle. For dozer operations the OTS is normally driven at a speed of 4 km/h (2.5 mph) and can move 80 m^3 (2,825 cu ft) of light soil per hour, reducing to 40 or 50 m^3 (1,413 or 1,766 cu ft) of medium soil per hour. The dozer blade is cable operated.

Unlike the BAT tractor dozer based on the AT-T heavy tractor, the OST has a straight dozer blade which cannot be used at an angle. Neither a V-type dozer nor specialized attachments can be fitted.

In the past the AT-S was also seen with a fully enclosed box body to carry communications equipment and specialized battlefield radars.

Specification

AT-S

Crew: 1+6

Weights: empty 12000 kg (26,455 lb); loaded 15000 kg (33,069 lb)

Powerplant: one V-54-T V-12 water-cooled diesel developing 186 kW (250 hp)

Dimensions: length 5.87 m (19 ft 3.1 in); width 2.57 m (8 ft 5.2 in); height, top of cab 2.535 m (8 ft 3.8 in)

Performance: maximum road speed 35 km/h (22 mph); range 350 km (217 miles); fording 1.0 m (3 ft 3 in); vertical obstacle 0.6 m (2 ft 0 in); trench 1.45 m (4 ft 9 in); gradient 50 per cent; side slope 30 per cent

USSR

AT-T Heavy Tracked Artillery Tractor

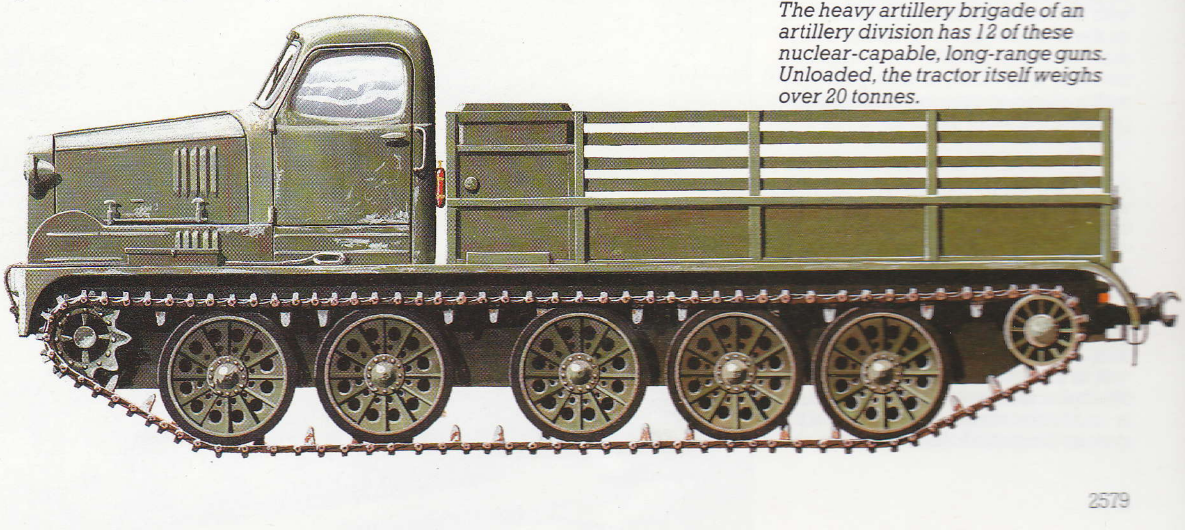
The USSR introduced the **AT-T** heavy tracked artillery tractor in 1950 to tow the 130-mm (5.12-in) heavy anti-aircraft gun, but later it was also used to tow the 180-mm (7.09-in) S-23 nuclear-capable gun/howitzer and the 130-mm SM-4-1 mobile coastal artillery weapon.

The AT-T heavy tracked artillery tractor is very similar in appearance to the ATS-59, and its capabilities include towing a trailer or weapon weighing up to 25000 kg (55,115 lb) and carrying cargo such as ammunition or stores up to 5000 kg (11,023 lb) in weight.

The engine is mounted at the front of the vehicle with the fully enclosed, fully heated four-man cab to its rear and an open-topped cargo area at the very rear. The last has high sides, a drop tailgate, removable bows and a tarpaulin cover. When the AT-T is used to tow artillery weapons the members of the gun crew are seated on bench seats running across the full width of the cargo area.

Suspension of the AT-T is of the standard torsion-bar type which gives good cross-country mobility, with five dual rubber-tyred road wheels, and the drive sprocket at the front and the idler at the rear; there are no track-return rollers. Mounted at the rear is a

The AT-T is the oldest and largest tracked prime mover still in front-line service with the Soviet army and is used to tow the S-23 180-mm gun. The heavy artillery brigade of an artillery division has 12 of these nuclear-capable, long-range guns. Unloaded, the tractor itself weighs over 20 tonnes.



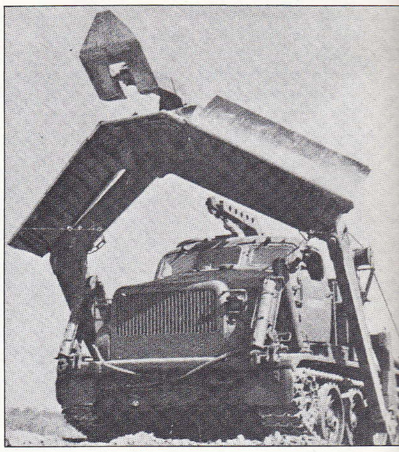
power-operated winch which can be used for self-recovery or to recover other vehicles and equipment.

There are a number of variants of the AT-T, including a lengthened version (with seven road wheels) used to mount the 'Long Track' long-range early-warning radar associated with the SA-4 'Ganef' and SA-6 'Gainful' surface-to-air missile systems. Another AT-T has a fully enclosed van body on the roof of which is installed the 'Track Dish' (ARSOM-1) battlefield radar system.

The chassis is also used as the basis for the **BTM** and **MDK-2** ditching machines, while dozer versions are known as the **BAT** and **BAT-M**. There are actually four versions of the BTM, the basic version consisting of a standard AT-T heavy tracked artillery tractor with an ETR-409 ditching machine mounted at the rear. This can dig a trench 0.80 m (2 ft 8 in) wide to a maximum depth of 1.5 m (4 ft 11 in). In all these versions the circular digging machine is carried vertically at the rear.

The MDK-2 pit digging machine has the circular digging equipment carried horizontally at the rear and swung through 90° when required. The machine can dig a ditch to a maximum depth of 4.5 m (14 ft 9 in) and a width of 3.5 m (11 ft 6 in), which makes it ideal for the rapid excavation of weapon and vehicle pits in the forward battlefield area.

The BAT and BAT-M are standard AT-Ts with a powerful dozer blade mounted at the front of the hull. These are used for preparing firing positions and obstacles, or for clearing obstacles in the forward battlefield area.



Many Soviet tracked prime movers can be fitted with bulldozer blades, but the AT-T forms the basis for the BAT engineering vehicle. The BAT-M tractor dozer is electro-hydraulically operated, this example having an extra grouting tongue mounted on the blade.

Specification
AT-T
Crew: 1+3
Weights: empty 20000 kg (44,092 lb); loaded 25000 kg (55,115 lb)
Powerplant: one Model V-401 V-12 water-cooled diesel developing 309 kW (415 hp)
Dimensions: length 6.99 m (22 ft 11.2 in); width 3.17 m (10 ft 4.8 in); height, cab 2.58 m (8 ft 5.6 in)
Performance: maximum road speed 35 km/h (22 mph); range 700 km (435 miles); fording 0.7 m (2 ft 4 in); vertical obstacle 1.0 m (3 ft 3 in); trench 2.1 m (6 ft 11 in); gradient 60 per cent; side slope 30 per cent

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JAPAN

Type 73 Full-Tracked Artillery Tractor

When the Japanese Ground Self-Defence Force (JGSDF) was formed in the 1950s it was supplied with its initial equipment by the USA. This equipment included not only tanks (Shermans and Chaffees), towed artillery, anti-aircraft guns and infantry weapons, but also a considerable number of M4 and M8 high-speed tractors.

The M4 and M8 gave good service, but it was later decided to design and develop a new Japanese tracked artillery tractor to tow weapons such as the 155-mm (6.10-in) M59 gun (nicknamed the 'Long Tom' by the US Army during World War II) and the 203-mm (8-in) M115 howitzer.

After trials with prototype vehicles the Hitachi Manufacturing Company was awarded a production contract for a tracked artillery tractor called the **Type 73**, '73' standing for the year in which it was standardized.

First production vehicles were completed in 1974, but the Type 73 has not been built in large numbers as the Japanese army, like those of many other countries, has in recent years been placing increased emphasis on self-propelled artillery, these including the 105-mm (4.13-in) Type 74 and the 155-mm Type 75 self-propelled howitzers. More recently Japan has started to manufacture the US 203-mm M110A2 self-propelled howitzer under licence.

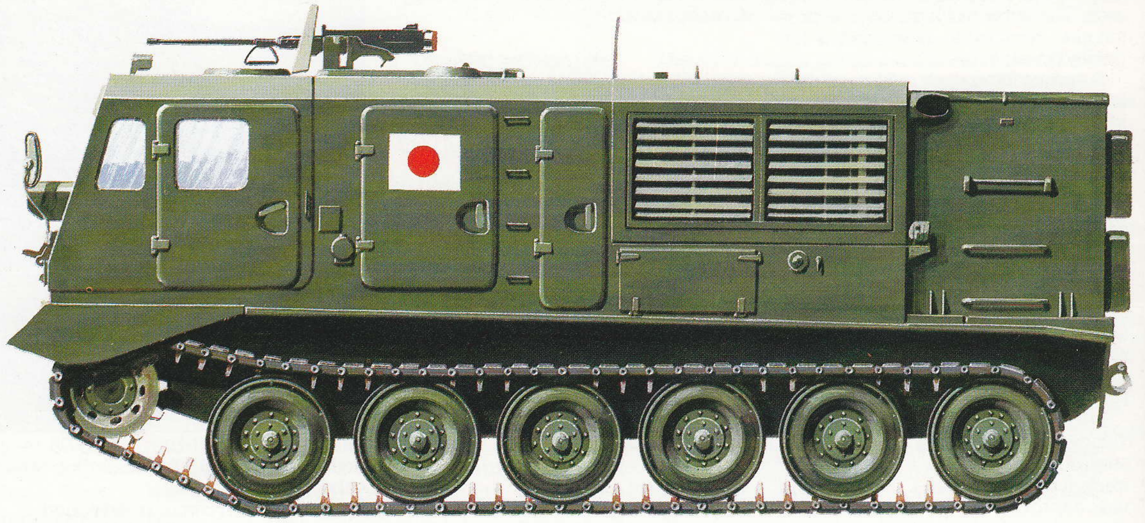
The Type 73 has a fully enclosed all-steel cab at the front of the vehicle, with two entry doors in each side, and on the roof is a cupola mounting a 12.7-mm (0.5-in) M2HB anti-aircraft machine-gun. This is also provided with a shield to give the gunner some protection against small arms fire and shell splinters from the front.

The engine compartment is to the rear of the troop compartment, and the ammunition is carried in a protected compartment at the very rear.

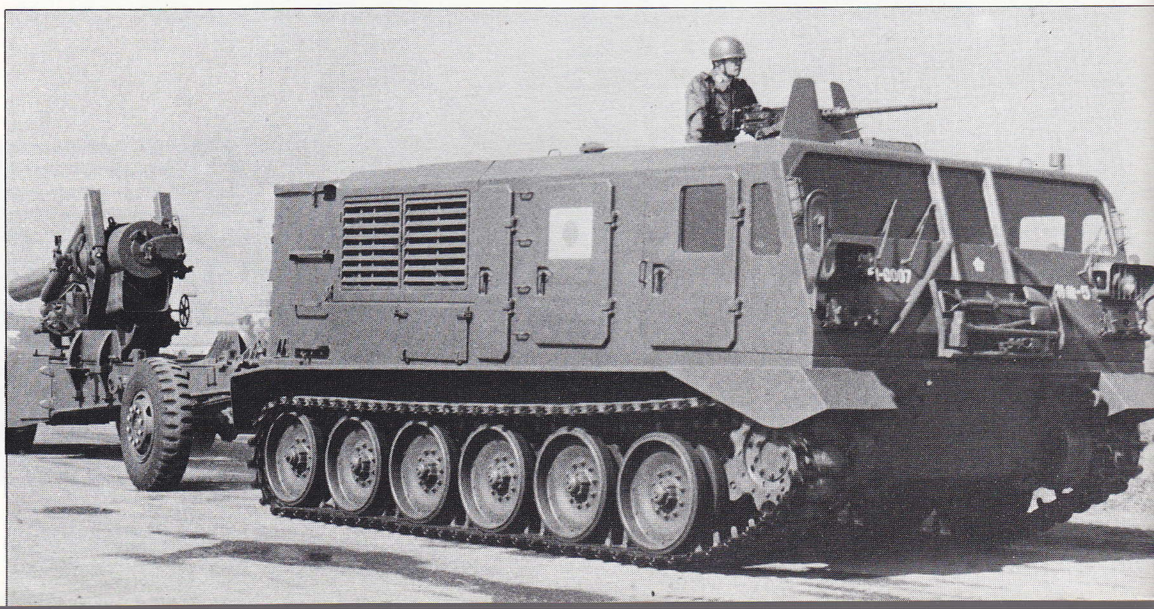
Suspension is of the torsion-bar type with six large rubber-tyred road wheels. The drive spocket is at the front and the sixth road wheel acts as the idler; there are no track-return rollers.

It is believed that the Type 73 is fitted with infra-red driving lights, but it is uncertain whether or not an NBC system is installed. Some vehicles are fitted with a hydraulically operated dozer blade at the front of the hull, this being used to prepare fire positions and to clear obstacles from the path of the vehicle.

Specification
Type 73
Crew: 1+11
Weight: loaded 19800 kg (43,651 lb)
Powerplant: one Mitsubishi ZF6 6-cylinder air-cooled diesel developing 298 kW (400 hp)
Dimensions: length 6.13 m (20 ft 1.3 in); width 2.95 m (9 ft 8.1 in); height 2.30 m (7 ft 6.6 in)
Performance: maximum road speed 45 km/h (28 mph); range 300 km (186 miles); fording 1.0 m (3 ft 3 in); vertical obstacle 0.6 m (2 ft 0 in); trench 2.0 m (6 ft 7 in); gradient 60 per cent; side slope 30 per cent



The Type 73 has not been manufactured in large quantities as the Japanese Ground Self-Defence Force soon began to favour self-propelled artillery.

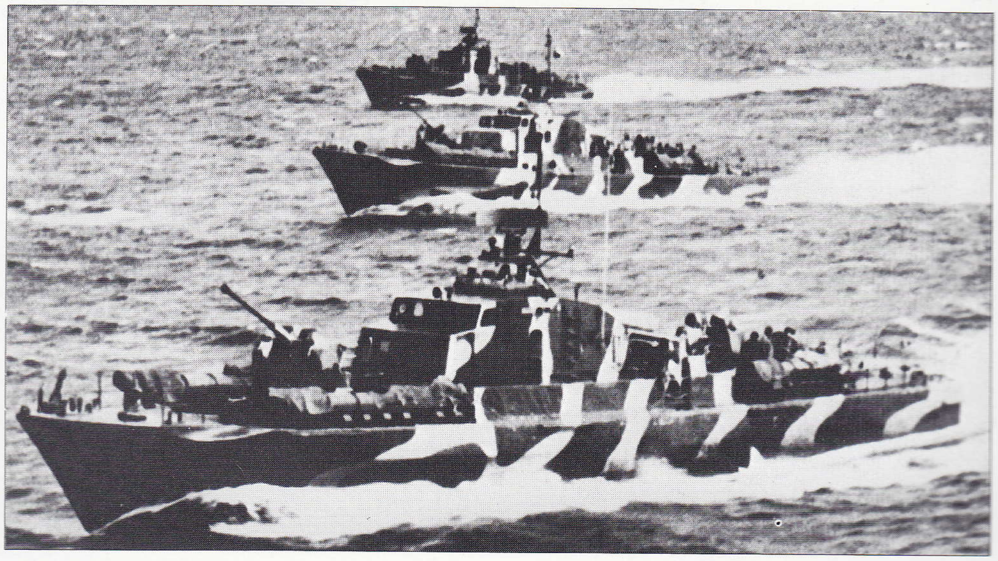


A Type 73 tractor tows the trusty 155-mm M59 'Long Tom' of World War II vintage, still a fine piece. Unusually, the anti-aircraft gun is fitted with a small shield.

Chile

The army has been involved in some way or other with the political running of Chile since independence, but this tendency has increased greatly since the military coup of 1973. Apart from internal anti-terrorist operations, which are now primarily the province of the police, the armed forces are deployed mainly to cover potential border disputes with the neighbouring countries of Argentina, Bolivia and Peru. During the 1982 Falklands war between Argentina and the UK, covert aid was apparently supplied to the latter in return for military aid and spares.

The country is divided for military purposes into six Internal Security Complexes (or Divisions): Internal Security Complex 6 faces Bolivia and Peru, Internal Security Complex 5 faces Argentina, and Internal Security Complex 2 contains the major cities and the main military training centres. Although staunchly pro-Western, Chile still finds it difficult to obtain new equipment for the armed forces because of concern over civil rights abuses since the coup.



The Lürssen Fast Attack Craft (torpedo), seen here on patrol in the Beagle Channel, were commissioned in the mid-1960s. Built to a West German design, they displace 134 tons and are fitted with four 533-mm (21-in) torpedo tubes, carry two 40-mm (1.57-in) guns, and are capable of up to 32 kts.

Chilean army

The Chilean army has six divisional headquarters, assigned one to each Internal Security Complex. Each of these formations consists in theory of three infantry regiments, one Andean mountain regiment, a cavalry brigade (of two regiments), one field artillery group, one mountain artillery group, one engineer battalion and supporting units. However, because of the potential border disputes, the three Internal Security Complexes mentioned above have been reinforced at the expense of the others. For army level work there is an engineer regiment and the Boinas Negros special forces battalion. A full list of army units includes:

six divisional headquarters,
two armoured regiments,
eight cavalry regiments (three mechanized and five horsed),
24 infantry regiments (14 each with two battalions and 10 Andean each with between one to four battalions),
10 artillery groups (six field, three mountain and one air defence),
one engineer regiment,
seven engineer battalions, and
one special forces battalion.

There is also a small army aviation service which operates a composite fixed-wing and helicopter group with a tactical battalion and a support unit. This flies some 28 helicopters and 37 fixed-wing aircraft, of which the most important are the 10 Aérospatiale SA 330FL Puma, 10 Aérospatiale SA 315B Lama and three Bell UH-1H helicopters, plus six CASA C-212 tactical transports and 18 Cessna R172 Hawk light liaison and ground support aircraft.

The two armoured regiments operate a mix of AMX-30 MBTs with both AMX-13 and M41 Bulldog light tanks. The last also serve in the mechanized cavalry units, together with both wheeled and tracked APCs. All the World War II era armour has now been relegated to training schools and second-line units. Since the mid-1970s about 200 Brazilian-built EE-9 Cascavel armoured cars and some 250 EE-11 Urutu APCs have been procured to replace those vehicles not relegated to the reserve role. A local firm, Cardoen, is also licence-building the Swiss MOWAG Piranha 6×6 wheeled APC as well as several indigenous APC designs. The same firm and some others are also producing ammunition, explosives and locally developed anti-aircraft weapons. A complete list of army equipment includes:

armour: AMX-30 and M4A3 Sherman MBTs; AMX-13, M3A1 Stuart and M41A3 light tanks; EE-9 Cascavel armoured car; M113A1, Cardoen-MOWAG Piranha, EE-11 Urutu and M3 APCs;
artillery: (towed) 105-mm (4.13-in) howitzer, 105-mm M56 pack howitzer, 105-mm FH18 howitzer; (self-propelled) 155-mm (6.1-in) Mk F3 howitzer; (mortars) 60-mm (2.36-in) M19, 81-mm (3.2-in) M1/M29 and 120-mm (4.72-in) Hotchkiss-Brandt;
anti-armour weapons: 57-mm M19 and 106-mm (4.17-in) M40A1 recoilless rifles; and Mamba and Milan ATGWs;
anti-air weapons: 20-mm GAI-CO1, 20-mm Rh202, 35-mm Oerlikon K63, 40-mm M1 Bofors and 40-mm Bofors L/70; and
small arms: 7.62-mm (0.3-in) SIG510, 7.62-mm G3 and 7.62-mm FN assault rifles; 9-mm Madsen M53 and 0.45-in (11.43-mm) MAC10 SMGs; 7.62-mm MAG and 7.62-mm MG42 LMGs; and 0.5-in (12.7-mm) Browning HMG.

In wartime a total of 240,000 army reserves can be mobilized to join the 53,000 strong standing army. Of the latter 30,000 are conscripts serving a two-year term.

Chilean navy

The 22,500-strong Chilean navy is based on Royal Navy traditions and guidelines, and amongst its ranks numbers some 3,000 conscripts. It is supported in its operations by a small 500-man naval air force which operates a single squadron of six EMBRAER EMB-111N maritime patrol aircraft, a utility squadron with four CASA C-212s and three EMB-110Ns, a training squadron with 10 Pilatus

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DISCO

A Chilean army M41 light tank leads a column of troops into Santiago to crush a riot during the 1973 military coup. US complicity and the ferocity of the purge that followed made this particular coup especially notorious. Today, the increasingly embattled military regime still clings to office.

12 PASS

PC-7 Turbo Trainers, and a helicopter squadron with 10 Aérospatiale Alouette IIIs and five Bell 206As for shipboard and shore base use.

There is also a 5,000-man marine corps which is divided into four battalion groups that comprise amphibious warfare, coast defence and local security elements, together with a specialized commando unit. The weapons used include 16 M101 105-mm and 35 M114 155-mm howitzers, MOWAG Roland 4×4 APCs, LVTP-5 amphibious assault vehicles, some 20 37-mm M1A1 AA guns and a small number of Cactus (Crotale) SAM systems and 16 155-mm GPFM-3 coast-defence guns. The small arms used are the same as those of the army, with close support provided by 50 60-mm and 50 81-mm mortars.

There are three naval zone commands, the equipment acquired over the last decade or so reflecting Chilean ties with the UK and West Germany. The most recent acquisitions have been two ex-Royal Navy 'County' class missile destroyers, two 'Type 209' West German-built submarines, three Israeli-built 'Saar 4' class missile boats, an ex-British RFA tanker and three locally-built but French-designed 'Batral' class LSTs.

The full list of units in the navy is:

submarines: two 'Type 209' class and two 'Oberon' class;
destroyers: two 'County' class, two 'Almirante' class and two ex-US 'Allen M. Sumner (FRAM II)' class;
frigates: two 'Leander' class;
light forces: three tug-type patrol vessels, three 'Saar 4' class missile boats, four Lürssen type fast attack torpedo boats, three large patrol craft and four coastal/harbour patrol craft;
amphibious warfare forces: the 'Batral' class LSTs and two locally-built LCTs; and
support ships: one survey, one training, four transport, three tanker, one submarine depot, two tug and miscellaneous vessels.

A small coast guard operates 10 43-ton coastal patrol craft, each armed with two 20-mm cannon and a pair of depth charges, on surveillance and anti-smuggling patrols.

Chilean air force

The Chilean air force is the world's fourth oldest independent air force, and like the other two Chilean services has suffered considerable difficulties in obtaining new aircraft since the coup. This has resulted in the setting up of an indigenous aerospace industry that is currently involved in building 80 modified Piper PA-28 Dakota primary trainers as the T35 Pillan, and 37 (with 23 more on option) Spanish-designed CASA C-101BB armed jet trainers as the T36 Halcón.

The Chilean air force is divided into three commands (Combat, Personnel and Logistics), but only the first has any aircraft, its strength being deployed in four combat wings and two combat groups. Each of the wings is also assigned a communications flight with light aircraft and/or helicopters.

Two of the three ground-attack squadrons fly some 26 Hawker Hunter F.Mk 71 fighters and five Hunter T.Mk 72 operational trainers, while the third is equipped with 15 Northrop F-5E and two F-5F Tiger IIs; the Northrop fighter uses both AIM-9 Sidewinder AAMs and a small number of Hughes AGM-65A Maverick air-to-ground missiles, while the sole interceptor squadron flies 14 single- and two two-seat Dassault-Breguet Mirage 50s armed with Israeli Shafrir and French R550 Magic AAMs. A counter-insurgency (COIN) force of two squadrons flies the 29 survivors of 34 Cessna A-37B Dragonfly light attack aircraft delivered in the mid-1970s.

For tactical and strategic reconnaissance duties two units operate two Learjet 35As, nine CASA C-101s and two survivors out of three recently-delivered refurbished BAe Canberra PR.Mk 9 high-altitude photo-reconnaissance jets.

The transport element is just as diverse, and is divided into nine squadrons which fly some 64 fixed-wing aircraft and helicopters. Of these the most notable are two Lockheed C-130H Hercules, five Douglas DC-6s, 17 de Havilland Canada DHC-6 Twin Otters, six Aérospatiale SA 315B Lamas and 13 Bell UH-1H Hueys.

The training for all the above is conducted by a specialist training wing of three air schools. They are currently replacing the Cessna T-37C jet trainer fleet with the T36, and the older Beechcraft T-34 Mentors and other piston-engined trainers with the T35.

For local defence of air bases there are five anti-aircraft groups and four radar squadrons. The former has a mix of quadruple 12.7-mm M55 HMGs, twin 20-mm Rheinmetall Rh202 cannon, twin 35-mm Oerlikon K63s and some two dozen elderly American single-barrel M1A1 37-mm guns. There are also a number of Blowpipe SAMs issued to one battery of each of the groups for use against low-level attackers.

Paramilitary force

The only paramilitary force available to Chile is the 27,000-man Caribinero service. In addition to their normal police equipment, these units have some light infantry weapons and around 20 MOWAG Roland 4×4 APCs. They also operate a small aviation element of fixed-wing aircraft and helicopters, plus a number of small patrol boats.

Two squadrons of the Chilean air force are assigned to the counter-insurgency role, equipped with a total of 29 Cessna A-37B Dragonflies, one of the most cost-effective light combat aircraft ever built. This A-37 can carry a possible 2576-kg (5,680-lb) weaponload; here the tip tanks are supplemented by underwing drop tanks.